approach

JUNE 1982 THE NAVAL AVIATION SAFETY REVIEW

1981
CNO Safety Award Winners

COMNAVAIRPAC
VA-146*
VF-21
VS-33
VP-40
HSL-35***
VC-5*
HC-3*
VA-95
VAQ-133
VAW-113
HS-2
RVAW-110
VA-127

CG FMFPAC
VMA(AW)-121
HMM-268
HMH-361*
VMFA-314
HML-267

CG FMFLANT
HMM-264
VMGR-252
HAMS-32
HML-167

COMNAVAIRLANT
VA-174
VF-41
VP-26
HS-15**
VF-43**
HM-12
VA-42
VS-30
VAW-124
VR-24
HSL-34

CG FOURTH MAW
HMM-764
VMA-133

CNATRA
VT-6*
VT-7
HT-8
VT-23
VT-10

COMNAVAIRESFOR
VA-303
VP-68
VF-202
VR-57
HS-75
VC-12*

COMNAVAIRSYSCOM
PACMISRANFAC HAWAREA
BARKING SANDS HI

CNO "Readiness Through Safety" Award

CHIEF NAVAL AIR TRAINING*

Admiral James H. Flatley Awards

CV – USS CORAL SEA
LPH/LHA – USS OKINAWA

*Second consecutive year
**Third consecutive year
***Fourth consecutive year

approach

Vol. 27 No. 12
NAVAIR 00-75-510

Two T-2 Buckeyes from VT-26 conduct a formation turn to the right. Photo by Capt Tim Hughes, USMC.

Temporal Distortions 2
By LtCol Douglas M. Carson, USAF. Watch out, or you can watch yourself crash in slow motion.

The Road to Zero Zero 7
By Richard A. Eldridge. On the ejection seat as prime mover.

Fling Wing Flip and Shipboard Helo Rollovers 12
By Maj J. P. Cress, USMC. Tight chains and a bottomed collective can save your life.

A Pat and Mike Story 20
By Russ Forbush. An H-3 sinks 85 nm from the carrier!

Mishap on the Cactus Moonscape 23
By LT Colin Sargent. Vibrating at the gray edges of controlled flight.

Air Breaks 10

Slithering Insinuations 16
By LT Terry D. Nuss

Bravo Zulu 18

Mindoro H-2 Scare 26
By LT Jeff Lee

Hawkeye With a Clipped Wing 28
By Richard A. Eldridge

Best Little Airport in South Texas 30
By the VT-23 Safety Department

Letters 32

RADM T. C. Steele, Commander, Naval Safety Center

CAPT S. P. Dunlap, Director, Aviation Safety Programs

CDR William E. Petitt, Head, Safety Publications
LT Colin W. Sargent, Editor
LTJG Kathryn T. Gray, Publications Manager
Robert Trotter, Art Director
Richard A. Eldridge, Writer
Russ T. Forbush, Helicopter Writer
Blake Rader, Illustrator
Jack LaBar, Illustrator
Frank L. Smith, Graphics
PH3 Ronald K. Bellenot, Photographer
Catherine M. Wizieck, Editorial Assistant
Patricia A. Kinter, Type Composer
Robin C. Miller, Type Composer
Doris Sumner, Circulation

Contents should not be considered as regulations, orders, or directives and may not be construed as incriminating under Art. 31, UCMJ. Views of guest-written articles are not necessarily those of NAVSAFECEN. Photos are Official Navy or as credited. Photographs used have no strict relationship to the text. Official distribution handled by NAVSAFECEN, Safety Pub. Dept., NAS Norfolk, VA 23511. Phone: (804) 444-1321; Autovon 690-1321. Printed in accordance with Dept. of the Navy Publications and Printing Regulations, NAVEXOS P-35. Library of Congress Catalog No. 57 60020.

TEMPORAL DISTORTIONS

By Lt Col Douglas M. Carson
Directorate of Aerospace Safety
Norton AFB

IN 1949, an Air Force second lieutenant took off from a western base as Dash-2 in a two-ship flight of bright, new fighter aircraft. Shortly after takeoff, he informed the pilot of the lead aircraft that he had lost aileron boost pressure and was experiencing control stick vibrations.

His leader leveled the flight at 11,000 feet, headed to some rugged 4,500-foot mountains to the north, and in-

structed him to drop his external fuel tanks. The lieutenant actuated the salvo switch, but only the left tank jettisoned. The aircraft went into an immediate roll to the right. He was able to stop the roll by using both hands and his right leg on the stick. When he moved his left hand to trim the ailerons, the aircraft rolled inverted, made a split-S and two complete rolls, and ended up in a vertical dive. He recognized a complete control loss at the same time his flight leader told him to bail out.

The aircraft was in a rolling vertical dive at 1,000 feet above the terrain when the pilot ejected. He described what happened next. "I put my feet in the footrests on the seat and pulled both seat handles at the same time. The seat worked perfectly, and I was thrown clear of the aircraft, with no injuries. Tumbling through the air, I released the seat and pulled the ripcord at the same time. Somehow, the seat fouled up in the shroudlines of my parachute and came to rest on my head. I tried to get the seat off but could not do so before I hit the ground. I landed about 40 feet from the burning wreckage of the aircraft with the seat still resting on my head."

He also lost his helmet, oxygen mask, wristwatch, dog tags, and even his boots. Nevertheless, he survived and became the first U.S. Air Force crewmember to use an ejection seat to escape from an aircraft in trouble.

From that first ejection in 1949 to the end of 1981, this select group of airmen totaled 4,700, excluding combat ejections. Of these, 3,845, or 82 percent, were successful. That's not really too bad considering the capabilities of the early escape systems.

Unfortunately, if we look at the ejection survival rate for the last 5 years, we see a less optimistic picture. The overall survival rate was 75 percent. In 1975, the ejection survival rate was 91 percent. In 1980, it declined to 69 percent (*see p. 9 for Navy/Marine statistics – Ed.*).

This decline has continued despite the fact that our automatic escape systems have undergone constant improvement since their inception. Single-motion initiation, rocket cata-

pults, automatic-opening lapbelts, man/seat separators, seat stabilization devices, ballistically deployed parachutes, and automatic opening survival kits are just some of the improvements which were designed to increase crewmembers' chances of survival.

The first question that arises is: Why is the Air Force ejection survival rate declining when our escape systems are continually improving?

Accident analysis has revealed that the majority of the fatalities were not due to mechanical malfunctions but were the direct result of delayed ejection attempts. If the assumption is made that every crewmember who attempted to eject was actually trying to save his life, this raises another question: *Why did one out of every five guys wait too long?*

Since out-of-the-envelope ejection attempts usually result in fatalities, the safety investigation boards haven't been able to ask any of those airmen why they failed to make timely escape decisions. Using their best judgment and expertise, board members can only speculate on what deceased crewmembers perceived during the last few seconds of their lives. The single major explanation which has emerged from mishap reports is something called loss of situational awareness.

This doesn't mean a crewmember is disoriented. He knows what's going on, but he becomes preoccupied with a problem and isn't totally aware of how rapidly the situation is deteriorating. Loss of situational awareness is a general term which can partially explain what has happened, but in my opinion, it doesn't explain *why* it happened. Why do so many highly trained aviators lose situational awareness in critical emergencies, and what can we do about it? To answer this question, we have to take a look at what happens to an individual under stress.

It would probably be the understatement of the 20th Century to say that an aviator who is suddenly faced with an ejection decision has been placed in a condition of acute stress. Most discussions of stress deal with the long-term effects – high blood pressure, ulcers, heart attacks, etc. Let's take a look at what happens to the body in the short-term (acute) phase.

In the course of evolution, animals have developed an amazing mechanism to defend themselves against all kinds of assaults. This defense mechanism is the "fight or flight" response, an involuntary alarm reaction to conditions of acute stress.

When the brain perceives a threat (stress), it reacts by exciting the hypothalamus. The hypothalamus in turn stimulates the pituitary glands to inject adrenocortiotrophic hormone (ACTH) into the blood. ACTH signals the adrenals to immediately secrete two substances – cortisone and adrenaline.

Cortisone's effects are generally of a long-term nature, but adrenaline has immediate effects.

The emergency discharge of adrenaline (a stimulant) increases the pulse rate and blood pressure. Perspiration increases. Sugar levels of the blood are raised to provide additional energy. The muscles tighten in preparation for immediate use, physical strength is dramatically increased, and the threshold of pain raises. The body is now prepared to fight or flee.

The discharge of hormones also triggers the entire nervous system, which becomes alarmed in preparation for combat. This brings us to the little-discussed phenomenon I call TEMPORAL DISTORTIONS, which is the key subject of this whole article.

Before we go any further, let's get a working definition of this term. *A temporal distortion is a temporary, false perception which slows the apparent passage of time.* When an individual experiences a temporal distortion, time expands and events appear to happen in slow motion. This can occur automatically under conditions of acute stress, but it can also be artificially induced by certain drugs such as marijuana.

The exact physiological process is not precisely understood, probably because little, if any, research has been conducted to investigate this phenomenon. It seems that the brain instantly becomes intensely alert, increases its efficiency, and begins to process information at an accelerated rate. Regardless of the actual physiological process, the phenomenon is real, and the result is that time appears to slow down. This is part of a remarkable defense mechanism which has evolved over millions of years. It has obviously been successful in the environment in which it evolved, since we're here today. Unfortunately, this survival characteristic which has proven so successful in our natural environment may be *the principal cause* of delayed ejection attempts, which are directly responsible for the USAF's tragic 20 percent ejection fatality rate.

The following examples of successful ejections can help show how often temporal distortions occur under acute stress and how dramatic the change in time perception can be. A hypothetical case will then illustrate how a temporal distortion can kill.

These examples contain the actual comments made by the surviving crewmembers. Bear in mind that since temporal distortions had not been recognized by the USAF, comments about this phenomenon were unsolicited – they were provided by individuals who felt the subject was important enough to mention. All of these mishaps occurred within the last 36 months.

- The first mishap was a midair collision between two F-4s. The WSO of one aircraft made these comments: "Ejection was initiated with minimum decision time (.5 - 1 sec) by me.

APPROACH (USPS 016-510) is a monthly publication published by Commander, Naval Safety Center, Norfolk, VA 23511. Subscription price is $15.00 per year; $3.75 additional for foreign mailing. Subscription requests should be directed to: Superintendent of Documents, Government Printing Office, Washington, DC 20402. Controlled circulation postage paid at Norfolk, VA.

With a unified movement, I pulled the handle and threw my head back. (I practiced all ejections in simulators that way, so that action was automatic.) Between pulling the handle and canopy separation, I was aware of being enveloped in a fireball – time distorted, and I was acutely aware that the canopy had not yet separated."

• This mishap was also an F-4. Again, the comments are extracted from the WSO's narrative: "The emergency involved our left wing folding on takeoff. As soon as we were airborne, the aircraft started a roll to the left. I delayed ejection until I felt the aircraft would hit in a clear area. Time was expanded greatly, even though it was time to get out. Still no feelings of excitement. Waiting to eject felt no different than waiting to change my RMI for the next turn point. I assumed ejection posture and pulled the lower handle. Again there was time expansion. The canopy leaving, the seat going up the rail, and the aircraft disappearing below me seemed to take several minutes. Because of altitude, I had elected not to perform the four-line jettison, but it seemed to be taking forever to come down. Since I was coming down on the parking ramp, I wanted to see where I was going and what I was going to hit. Only a few seconds later, my feet hit the ground, and I felt a pain in my left ankle. I tried to release my shoulder harness, but only got the left one. After what seemed a very long time, I managed to release my harness and came to an immediate stop. Just as immediately, I was surrounded by people asking how I was, and the 1½-minute ordeal that seemed to take 10 minutes was over."

• This was still another F-4. The aircraft departed controlled flight at 2,000 feet above the terrain. Ejection was initiated at 1,200 feet AGL. Here are the aircraft commander's initial comments: "In retrospect, my perception of time is the most interesting aspect of the incident. After warning the WSO that recovery from our unusual attitude was doubtful and then putting all of my attention into aircraft control again, it seemed like minutes from the emergency's onset until our ejection. It was actually very few seconds."

In addition to these examples, other escape system reports included numerous indirect references to inaccurate time estimations. Two pilots reported parachute rides of 10 to 15 minutes after ejection. The computed descent time in one case was 7 minutes, and 5½ minutes in the second case. Several F-4 pilots mentioned a long time delay from the time the back seat left the aircraft until the front seat fired. The first female to use an escape system was a student pilot who ejected from a jet trainer following an engine fire and loss of control. After parachute deployment, she stated that "I sailed for about 3 to 4 minutes down to a farmhouse front yard on one of the main roads back to the base." However, ejection was initiated at approximately 2,000 feet AGL, so the parachute descent time was actually closer to 90 seconds!

I can personally attest to the fact that a temporal distortion can occur under stress, and its effect can be dramatic. While performing a functional check flight on an F-4, I experienced an engine bay fire. We took off only about 1 minute before I got a fire light, so I immediately declared an emergency and turned back to the airport. During the descent, level off, and base turn, everything was unhurried. The WSO and I completed the emergency checklist items. Total elapsed time to this point was 4½ minutes.

After rolling out on base leg, the situation and my perception of time changed dramatically. The landing gear and flaps would not extend, both fire lights and both overheat lights abruptly illuminated, two hydraulic systems went to zero, and aircraft control started to deteriorate. I told the WSO the aircraft was becoming uncontrollable and we would have to get out. I used what little control we had

left to point the aircraft toward a clear area. As soon as the aircraft was pointed away from the city, I told my backseater to bail out and grabbed my lower ejection handle. I felt that the flight time from the base turn to the ejection point was longer than the flight time up to the base turn. A radar plot later indicated that it was only 54 seconds.

The entire ejection sequence, from pulling the handle to parachute deployment, appeared to take at least 30 seconds. (It was actually 6 or 7 seconds.) I heard the rear canopy pop, was aware of a delay, and then heard the double bang as the rear seat departed the aircraft. It seemed to take several seconds before anything else happened. I looked at the instrument panel, confirmed both fire lights and overheat lights were still illuminated, and noted the aircraft's heading, altitude, airspeed, and engine instrument readings. I was totally amazed that the ejection sequence was taking so long, and I was thankful the aircraft wasn't in a dive. The front canopy finally departed with a loud pop. I was surprised there was no apparent windblast, and I still had time to think "OK, here it comes!" The explosive charge fired, and the aircraft appeared to drop away. Then the seat rocket motor ignited, and I blacked out momentarily from the acceleration. The only thing I was totally unprepared for was the noise. (It is loud!) The seat slowly pitched forward and started to roll to the right. For the first time, I was aware of windblast. The drogue gun finally fired, and a short time later the chute deployed with a "Whump."

I saw my backseater in his parachute and then directed my attention to our crewless aircraft. It appeared to be moving in slow motion as it approached the ground about a mile away. The thought that went through my mind was pure disbelief – it was impossible for the aircraft to fly that slowly! I watched the airplane impact in an empty field and start to break up. The fireball boiled up at about the same rate as a nuclear explosion.

At this point, I was so sure that I wasn't going anywhere I actually looked up to see if my chute were hung up on something! It seemed to take 5 or 6 minutes to reach the ground, even though the descent actually took about 1½ minutes.

My perception of the ejection sequence was that it took as long to happen as it took you to read my description of it. The point is: *Under acute stress, you cannot trust your sense of time!*

These temporal distortions, like spatial disorientations, are particularly dangerous because they are insidious. We tend to believe our perceptions. Our brains, like computers, take in information, process it, and make a decision. That decision is translated into a course of action. If some of the information is erroneous, the decision could be a bad one, and the resulting course of action, particularly in the case of an aviator, may be a fatal one. To illustrate this point, let me put you in the following hypothetical situation.

You've just completed two engagements on an ACM mission, and things couldn't have gone better if you'd written the script yourself. There is plenty of fuel left for one more engagement, so you're inbound and eagerly looking forward to making the humiliation complete for the other guys. Your wingman makes a quick call, "Lead, break right! Two bandits 4 o'clock high." You make the break and get a tally. A quick look shows they're committed nose low and really smoking. *(Hot dog! Pull just a bit and they'll overshoot. Then a quick reverse and we'll have 'em.)*

Suddenly your nose slices to the left, and you start an uncommanded roll as the nose descends through the horizon. Instinctively, you shove the stick forward to unload the aircraft. A cold flash shoots through your body and your mouth instantly feels dry. The aircraft is nose low and rotating to the left. *(Is this a rolling departure, or am I in a spin?)* A quick glance at the altimeter shows that you're passing 10,000 feet. *(This is getting serious!)*

The adrenaline is really pumping now, and everything is slowing down. *(Hey, the rotation rate is decreasing. It's about time. I'm starting to get a little low.)*

"Lead, bail out!"

"Stand by, two – I've just about got it!" *(I think I've just about got it. Everything's slowing down.)*

"You're too low! Bail out now!"

(Why doesn't this stupid bird respond? Everything is so sluggish. Holy cow, there's the ground! I don't believe it – I really gotta get out of this thing!) You grab the handle and pull. *(What's wrong? Why is it taking so long? There goes the canopy! Why doesn't the seat fire? OOF! What a kick! I'm still in the seat, and here comes the ground. What's taking the chute so long? If it doesn't open soon, I'm not going to make it . . .)*

It's tragic, but hundreds of aviators over the years probably had similar final thoughts. On top of that, they watched themselves die in slow motion. Don't let it happen to you!

Temporal distortions have not been treated seriously in the past. Now there is ample evidence which seems to indicate that they may be responsible for delayed ejection attempts. It's time to stop thinking of this phenomenon as a mildly interesting curiosity and start treating it seriously. It's a killer and has to be recognized as such.

Okay, so much for that. Now, what can you do? Here are some suggestions which might help you if you find yourself faced with an ejection decision.

- **Recognize the problem.** If you've read this article, you've made a start. Realize that this can happen to you when you're under acute stress.
- **Make the ejection decision on the ground.** The ejection decision is not an easy one. Believe me, it's the most difficult decision I've ever had to make. Don't wait until you're faced with an immediate decision. Plan your course of action in advance, and if the time comes, stick to your plan.
- **Believe your instruments, not your senses.** Treat a temporal distortion like a spatial disorientation. Remember, those ejection altitudes for controlled and out-of-control conditions are minimum recommended altitudes. Once you recognize the aircraft is gone, for whatever reason, write it off and get out! You've made the decision – now execute it immediately. Don't waste those few precious seconds.

–Article courtesy of FLYING SAFETY

The road to ZERO ZERO

a short history of ejections in naval aviation

By Richard A. Eldridge
APPROACH Writer

THE forerunner of our modern ejection seat had its beginning with the *Luftwaffe* in World War II. Experiments had begun as early as 1938, and by the end of the war, at least 60 German pilots had ejected from disabled aircraft. To say that Allied pilots observing any of these ejections were astonished would be an understatement. They simply didn't understand what was happening.

By then, hundreds of Navy fliers had been saved with standard parachutes, starting with the very first emergency lifesaving jump (on 20 October 1922) and continuing through the next 25 years. Now, the tremendous speeds of jet aircraft had rendered the old-fashioned bailout all but obsolete. And while the parachute was still a vital necessity, it had become an adjunct to a prime mover – the ejection seat.

August 9, 1949 was a red letter day in the life of VF-171's LT J. L. Fruin for two reasons – one, he was the first naval aviator to successfully eject from a naval aircraft in an emergency, and two, the ejection saved his life. He was flying a McDonnell F2H-1 *Phantom* and ejected at 597 KIAS.

It wasn't long before we discovered the ejection seat was indeed a lifesaver. In June 1950, the United States found itself embroiled in the Korean War, and many naval aviators flying in aircraft such as the F2H *Banshee*, F9F *Panther*, and FJ *Fury* ejected and were able to fly again in the war that wasn't a war.

CDR Ray Hawkins had the distinction of being the first naval aviator to eject through the canopy of his aircraft. The date was 4 August 1953, and at the time, he was leader of the Blue Angels. He was flying a supersonic F9F-6 *Cougar* from the *Grumman* factory on Long Island to NAS Corpus Christi. Control of the aircraft was lost, and despite every effort he made to right the aircraft and regain control, he realized he'd have to eject.[1]

He pulled the handle and blasted straight through the plastic canopy. At the time of ejection, he was well above 30,000 feet. After blacking out momentarily, he came to and attempted to grab the ripcord. Fortunately, he was unsuccessful and then realized he'd have to free fall a considerable distance because he had no oxygen and would probably pass out if his chute were deployed at that altitude. When he finally pulled the ripcord, he was on the verge of unconsciousness. It was later estimated that the chute deployed at about 29,000 feet. Even at that altitude, oxygen starvation threatened him, and he again blacked out for a short period.

When he came to again and could think more clearly, he decided to try "grunt breathing," a process of taking deep

breaths with the mouth closed and grunting hard. This puts pressure on air in the lungs and forces oxygen into the bloodstream. It worked, and he continued to grunt breathe until reaching 10,000 feet, where he could once again breathe normally. He landed safely in a cotton patch.

Approximately 4 years were to pass before another unique experience occurred in the history of the ejection seat. It was 1957 when a naval aviator ejected from his fighter interceptor *while it was underwater!*

"I was on 100 percent oxygen and had checked the regulator while the plane hesitated on the catwalk before going over the side. As soon as it hit the ocean, it filled with water. I reached up and unlocked the manual canopy release and then pulled the ejection curtain. This was done without much cogitation, as I'd decided that I'd eject if ever the need arose in this aircraft or any aircraft having a clamshell canopy.

"I didn't feel the force of ejection but vividly recall seeing the curtain out in front of me. The water pressure made the curtain pull at a 45-degree angle to me rather than down over my face, as in normal curtain actuation. I don't recall releasing my lapbelt and am confident that the automatic belt release functioned.

"I first tried to get rid of the seat by attempting to get out of it as if I were sitting on it. This wasn't successful, so I rolled out of the seat. At this point, I remember wondering which way to swim, but nature took care of this, and I started up."

It was later estimated that the ejection took place about 40 to 60 feet below sea level.

Another underwater ejection occurred following a night carrier landing. As the aircraft went into the port catwalk, the tailhook disengaged from the crossdeck pendant. Upon water entry, the pilot ejected using the lower ejection handle. The rescue helicopter was immediately on scene and placed a swimmer in the water. At the time of ejection, the aircraft was estimated to be inverted in a 40-degree nosedown attitude. The ejection was made at an angle nearly parallel with the surface of the water, about 15 feet beneath the waves.

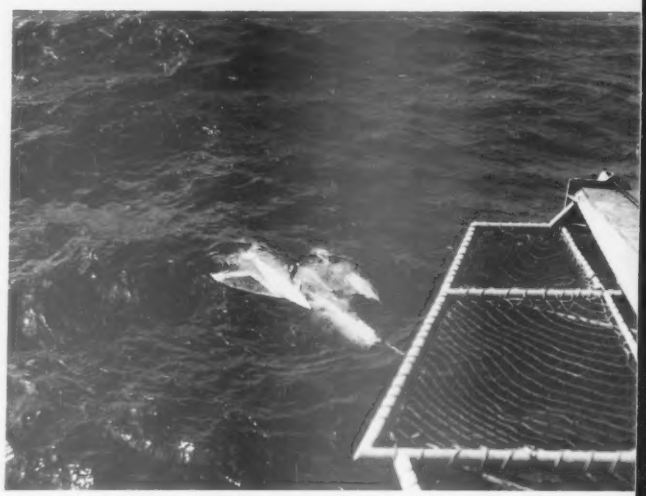
"After hitting the water, I hesitated about 1 second to allow the aircraft to submerge to 10 feet and then initiated ejection with the secondary handle. I recall only a loud bang and then being in the water, completely separated from the seat. I was not aware of seat-man separation. I didn't know which direction was up but noticed bubbles rising, probably from the oxygen mask which had slipped below my chin. I swam in the direction of the bubbles."

After World War II, the British thoroughly examined ejection seats from captured German aircraft. The British had begun their own studies in 1944 to improve on the German seats. The early German seats were fired by compressed air guns. Although they were successful, one of the seat's deficiencies was the tremendous "kick" it gave the pilot in ejecting him from the cockpit. Because of this instantaneous G explosion, a pilot often suffered spinal injury.

The man who was to achieve everlasting renown in the design of ejection seats, Sir James Martin, quickly appreciated the need for an improved ejection system. As managing director and chief designer for the Martin-Baker Aircraft Company in Great Britain, he began his human tests with very short rides up a test rig of guide rails. The first few shots were very successful, but on the 14th ride, the individual suffered crushed spinal vertebrae. Determined to find out what went wrong, Martin went to the hospital and was shown the x-ray plates.

"Then, he acquired part of a human skeleton on which he made acceleration tests. From these tests, he learned two very important things. He found that the spine could tolerate relatively high acceleration without injury, provided that the vertebrae were square to one another, and that the explosion pressure in the ejection gun came on relatively slowly before being increased to its maximum pressure."[2]

Martin redesigned his ejection seat to keep the spine straighter, with more clearance between the vertebrae. He also found a way to shoot the seat out in a less violent manner.



Two cartridges were fitted so that the second was ignited by the first after the seat had started to rise. It provided a smoother thrust, yet gave enough impetus to the seat to shoot it well clear of the tail section.

In 1951, Martin came out with an automatic seat. "This seat incorporated an aneroid-controlled clock mechanism which, at any preset altitude and after any predetermined delay, operated a mechanism that unfastened the seat harness, freed the pilot from the seat, and opened his parachute for him. Below the preset altitude, all these things happened almost immediately after ejection in such rapid sequence that safe ejection was possible down to 500 feet. All the pilot had to do was jettison his canopy and pull the face curtain to fire his seat. If he passed out after that and all went well, he'd wake up safely on the ground."[3]

This feature was a giant step forward for ejection systems. In multiseat aircraft with a command ejection capability, it allows one crewmember to eject another if he is unconscious, incapacitated, or otherwise unable to perform the ejection sequence himself. Martin now set about to find a capability of ejecting aircrews safely below 500 feet. He solved his problem by using two drogues in tandem. This allowed him to reduce the time delays to a half-second for the drogue gun and 3 seconds for the separating mechanism. Thus, 3½ seconds after initiating an ejection, the crewmember was in a fully-

Navy/Marine Corps Ejections (1949-1981)

Aircraft Model	No. of Ejections	No. of Fatalities
A2D	1	1
A-4	477	67
TA-4	204	34
A-5	88	19
A-6	190	37
EA-6B	53	5
A-7	275	38
TA-7	5	0
F/A-18	1	0
AV-8	26	2
F-1 (FJ)	138	17
F-2	55	7
F-3	88	12
F-4	656	88
F-5	2	0
F-6 (F4D)	77	9
F-7U	25	6
F-8	455	57
F-9/TF-9	396	80
F-11	56	7
F-14	95	14
OV-10	28	7
S-3	13	7
T-1	21	3
T-2	118	21
T-33	62	11
TT-1	1	0

Survival Rate

1975	81%		1949-1981
1976	78%		overall rate
1977	81%	Last 5 years	85%
1978	80%	(1977-1981)	Total ejections 3,606
1979	84%	83%	Total fatalities 549
1980	86%		Total survivors 3,057
1981	86%		(excludes combat ejections)

*Navy/Marine Corps ejection survival rates show a very steady and promising increase in the last 5 years. From a low of 78% survival in 1976, the survival rate has risen to an encouraging 86% for both 1980 and 1981. Still, we're trying to eliminate that final 14%, and temporal distortions (see the article on p. 2) may just be our No. 1 enemy.

deployed parachute.

"If the aircraft were flying straight and level at the time, the seat would continue traveling forward in the first vital seconds with no great loss of height, and ejection as low as 100 or even 50 feet was possible – up to 600 mph."[4]

With his usual determination, Martin achieved this goal and then set his sights on conquering the last 50 feet. He discovered that if the time delay could be lowered from 3 seconds to 1½ seconds, the ground level ejection could be accomplished. However, such an achievement could only be attained if the ejection were made at a low airspeed.

"At high speeds, this period of delay was insufficient to permit the seat to decelerate to a speed at which it was safe to deploy the main parachute. Ideally, a unit was required which would incorporate a delay varying in accordance with the speed at the time of ejection, and some means was therefore sought of combining both the 3-second and 1½-second delays in the same unit. The result was an automatic selector known as the G switch, which was adapted to fit the 1½-second time delay unit . . . With the introduction of the G switch, it was therefore possible to provide for safe ejections at all speeds likely to be encountered by modern aircraft."[5]

The ultimate in ejection seat performance occurred on 28 August 1957 at NAS Patuxent River. Both the U. S. Navy and the Martin-Baker Company had been concentrating on improving the seat's design until they reached a desired ground level capability (aided by forward motion).

"On that day, a fantastic demonstration took place. It was a landmark in escape systems development, and for the man who did the job, Flying Officer S. Hughes of the RAF, a heart-stopping test of daring and guts. For this was the world's first runway ejection.

"Six seconds after pulling the face curtain (probably the longest 6 seconds he would ever know) the brave test subject landed safely under a fully deployed chute."[6] The ground level seat had arrived!

"In less than 4 years, on 1 April 1961 at the Martin-Baker Company's airfield, the first live ejection was made at zero airspeed and zero altitude. A Mr. W. T. Hay was ejected 200 feet into the air with the aid of a rocket-assisted seat. It was a complete success, and a fully-developed parachute was achieved. Later in 1961, the same Mr. Hay repeated this test successfully at the Paris Air Show."[7]

The ejection seat today is a far cry from those developed by the Germans in the 40s and improved by the British in the 50s. Today, ejection seats in jet aircraft are sophisticated pieces of equipment capable of saving fliers' lives from altitudes of 40,000 feet plus right down to zero feet while still on the runway or carrier deck.

The most important fact gleaned from mishap reports, ejection seat studies, and analyses is that pilots and other crewmembers must not be lulled into a false sense of security because they have a so-called "zero zero" seat. A "zero zero" seat is *not* going to be a lifesaving instrument at deck level when an aircraft is in a high-speed dive, a steep bank, or in a high sink rate at 2,000 or 3,000 feet. The "zero zero" capability applies only to situations when the aircraft is ***straight and level on the deck or runway***. Under any other conditions, the additional dimensions of attitude and sink rate must be taken into consideration. Naval Safety Center analysts believe the term "zero zero" is a moth-eaten security blanket that has led some pilots to delay ejecting until it's too late. Thorough knowledge of your escape system capabilities under all conditions is your only security. ◄

Notes

1, 6 *Escape*, by Eloise Engle. (The John Day Co., Inc., New York, NY, 1963)

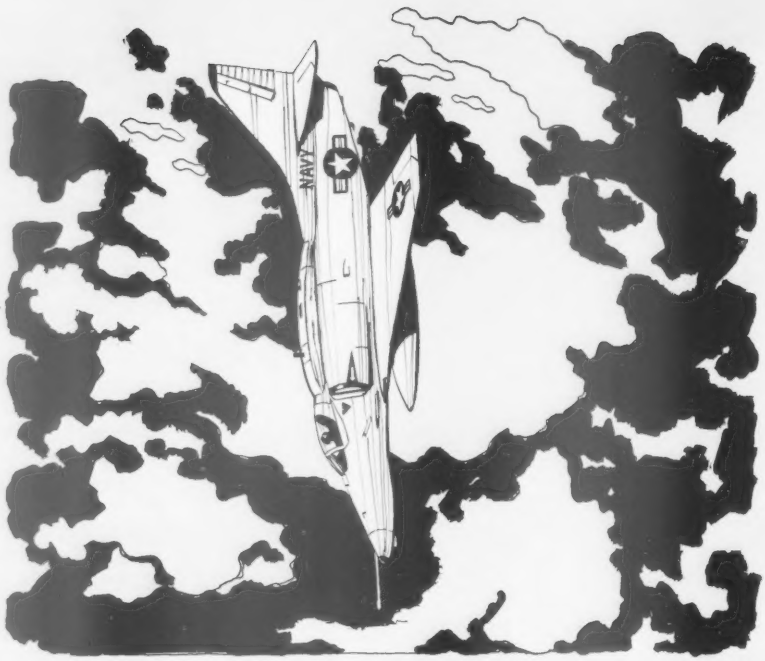
2, 3, 4 *Into the Silk*, by Ian Mackersey. (W. W. Norton and Co., Inc., New York, NY, 1958)

5, 7 "The History and Development of Martin-Baker Escape Systems." (Martin-Baker Aircraft Company, Ltd., Higher Denham, England, 1978)

A-4F Inverted Spin Recovery. During a 1vs.1vs.1 ACM training flight, an A-4F began to chase an F-5E vertically. As the airspeed bled below 100 knots at an altitude of approximately 26,000 feet MSL, the *Skyhawk's* nose attitude was decreased so that an upright, wings-level recovery to the nearest horizon could be effected. The nose moved smoothly through the horizon in a wings-level attitude with no roll or yaw. All controls were subsequently neutralized, with the stick held slightly aft to prevent overshoot of the 90-degree nosedown attitude. The pilot reduced power and locked his harness during the pitchover. The *Skyhawk* momentarily stabilized at approximately 90 degrees nose down and appeared to recover as airspeed increased from zero.

This was short-lived, however, as the aircraft then pitched slowly beyond 90 degrees nose down, started to roll left, and was subject to a rapid increase in negative G. The pilot tried to find the trim indicator as the spin developed but encountered severe difficulty due to the rapid yaw rate. Although he wasn't certain, the pilot felt trim to be at about zero and altitude at 18,000 feet MSL, with airspeed and angle of attack stabilized at or near zero. He was having trouble reading his instruments because of the rapid yaw rate, some oscillations, and steady negative G. The spin was verified to be inverted by zero units AOA and very pronounced negative G. Now, the pilot was having difficulty finding the turn needle, despite its central location. He finally located it, pegged to the right, with the aircraft at about 15,000 feet MSL (he had perceived left yaw from outside visual cues).

The pilot applied full left stick and rudder with the stick neutral to slightly aft. The A-4 responded almost immediately with a violent, more rapid last turn and pitched to nearly 90 degrees nose down. Airspeed increased quickly, and AOA



became positive as the controls were once again neutralized. The pilot was having difficulty recovering to straight and level flight, due to disorientation caused by the spin and jarring recovery. Observers counted nine fully developed turns. Antispin control was applied at approximately 15,000 feet MSL, and spin recovery was completed at about 12,000 feet MSL. A gentle pull to straight and level flight resulted in full recovery at 8,000 feet MSL. The G meter indicated -2.5G.

By preparing well for his flight, this A-4 pilot most likely prevented an *extremis* situation from becoming a catastrophe. He had checked his seating position and straps by flying inverted prior to engaging in ACM. Additionally, ensuring that the harness was locked just prior to spin entry was a major plus. His seat position allowed at least 3-4 inches separation between the top of his helmet and the canopy. The pilot stated that if the seat position had been higher, it would have caused a body position too high to see the instruments, especially if the helmet were pressed against the canopy. The pilot's use of thunderstorm lights during this incident is significant. Once his attention was refocused from bright sunlight into the cockpit, the white floodlights greatly helped eye adjustment and eliminated delay in the recovery. With the pilot having difficulty locating the trim indicator and turn needle, had the cockpit been darkened by shadows, these instruments might have been unreadable. The pilot's training and preflight preparation enabled him to apply proper antispin procedures in accordance with

AIR BREAKS

NATOPS. The procedures proved effective, and the pilot was able to save an aircraft and quite possibly himself.

The unit submitting this hazard report recommended that other A-4 units adopt the following SOP prior to each ACM flight:

- Conduct a spin procedures review.
- Illuminate cockpit thunderstorm lights to eliminate shadows.
- Highlight the location of spin instruments, particularly the turn needle, with a brightly colored tape or paint.
- Adjust the seat for maximum helmet-to-canopy clearance.
- Check the seat and restraint adjustment in inverted flight prior to engagement.

This unit's CO made the following observations regarding this incident: "Spins can happen to even the most proficient and highly trained crews. In this case, training and proficiency helped save an aircraft. The NATOPS procedures worked, but it should be noted that several individual precautions taken by this pilot made them possible."

One Day's Report of Near-Misses: 13 April 1982. A recent near-midair collision (NMAC) report stated that an EA-6B pilot "under PAR control for multiple practice approaches . . . ducked in his seat, believing impact to be certain" when a local airliner passed less than 75 feet away. The airliner in this incident was under VFR advisory control conducted by a trainee, who was backed up by a fully qualified supervisor. As the command was drafting their NMAC report, yet another close call occurred in the local VFR touch-and-go pattern. To put the magnitude of the potential in perspective, the same day the first message was received, there was also an NMAC report concerning dissimilar Training Command aircraft during a departure from home base, as well as a report of an airliner passing approximately one-quarter mile from a TACAIR jet during a weapons exercise.

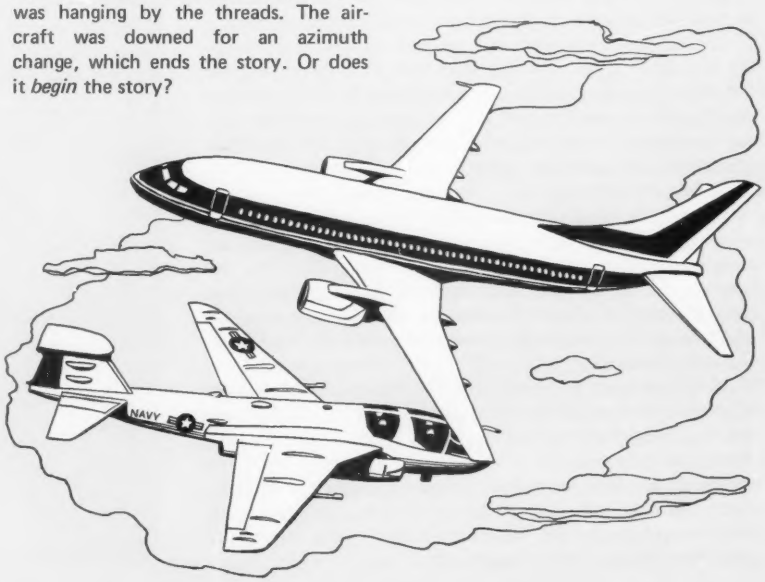
All of these incidents occurred in a location where a pilot might tend to lower his guard (under positive control or around the field), expecting advisories to give him a "heads up." The potential for a near-midair collision ends only after runway touchdown.

How Important Is a Thorough Preflight Inspection? Darned important, as the following tale vividly illustrates.

After a 4.5-hour flight, an SH-2F from HSL-35 was being prepared for an Alert 30 flight. While preflighting the aft transmission deck, LT Mitch Rosenberg noticed that the thread arrangement on the azimuth retainer looked odd, so he summoned the detachment's AMS1. Investigation revealed that the outer retainer was separated from the azimuth yoke and was hanging by the threads. The aircraft was downed for an azimuth change, which ends the story. Or does it *begin* the story?

The Det AMS1, long recognized for his technical expertise, stated it was virtually impossible for this vital control linkage to have stayed intact during another flight. Had it failed, the result would likely have been the loss of an aircraft and possibly a crew. By doing a simple task well — one that is all too often hurried and considered mundane — LT Rosenberg prevented a mishap from occurring.

The conduct of a thorough preflight may not be as exciting as bringing in the "ole" helo with one engine on fire and the other acting up, but as LT Rosenberg so aptly demonstrated, it can help keep an aircrew from facing an *extremis* situation. This incident is proof positive that a member of an aircrew is only as ready in the air as he is on the ground. By being prepared on *terra firma*, LT Rosenberg prevented a mishap and, in so doing, earned an AIRPAC "Pro of the Week" award. To this we add an Attaboy and a job well done.



FLIP WING FLING

and shipboard helo rollovers

By Maj J. P. Cress, USMC
Aviation Safety Programs
Naval Postgraduate School
Monterey, California

BLUE water ops and the big gray boat are no strangers to you. You've been afloat many times before, and the rocking and rolling flight deck of your LPH has become a familiar and perhaps comfortable environment. Even so, you're not so salty as to overlook the 7-foot swells, the resultant pitch, and the 5-degree heel. You'd just as soon have that 15-knot port wind on your nose for this launch.

About this time, your last troubleshooter has ambled out to your aircraft, where you've been turning – and waiting – for the last several minutes, and you note another bird launching from Spot 2, on your port side. Very soon thereafter, you feel the development of an uncomfortable right rolling motion despite your centered cyclic. In a split second, you sense comfort giving way to catastrophe as the right roll continues while you attempt to push the collective through the deck and the cyclic hits the left stop . . .

Despite the pilot's best efforts in the condition described above (and a full complement of chains and chocks), the aircraft continued in a right roll over the starboard deck edge and into the water, where it sank immediately. The copilot was lost, and the pilot was critically injured. While the crewmen and troubleshooters sustained only minor injuries, the aircraft was not recoverable.

Most helicopter pilots will recognize this sequence of events as typical of pure and simple dynamic rollover, and one need not look very hard to find numerous cases of aircraft being lost to this phenomenon. It's common knowledge that the risk of almost any kind of mishap is inherently higher on a moving deck, but have you ever wondered *why* this heretofore dryland hazard might be increased when you're shipboard? Let's take a closer look at the problem.

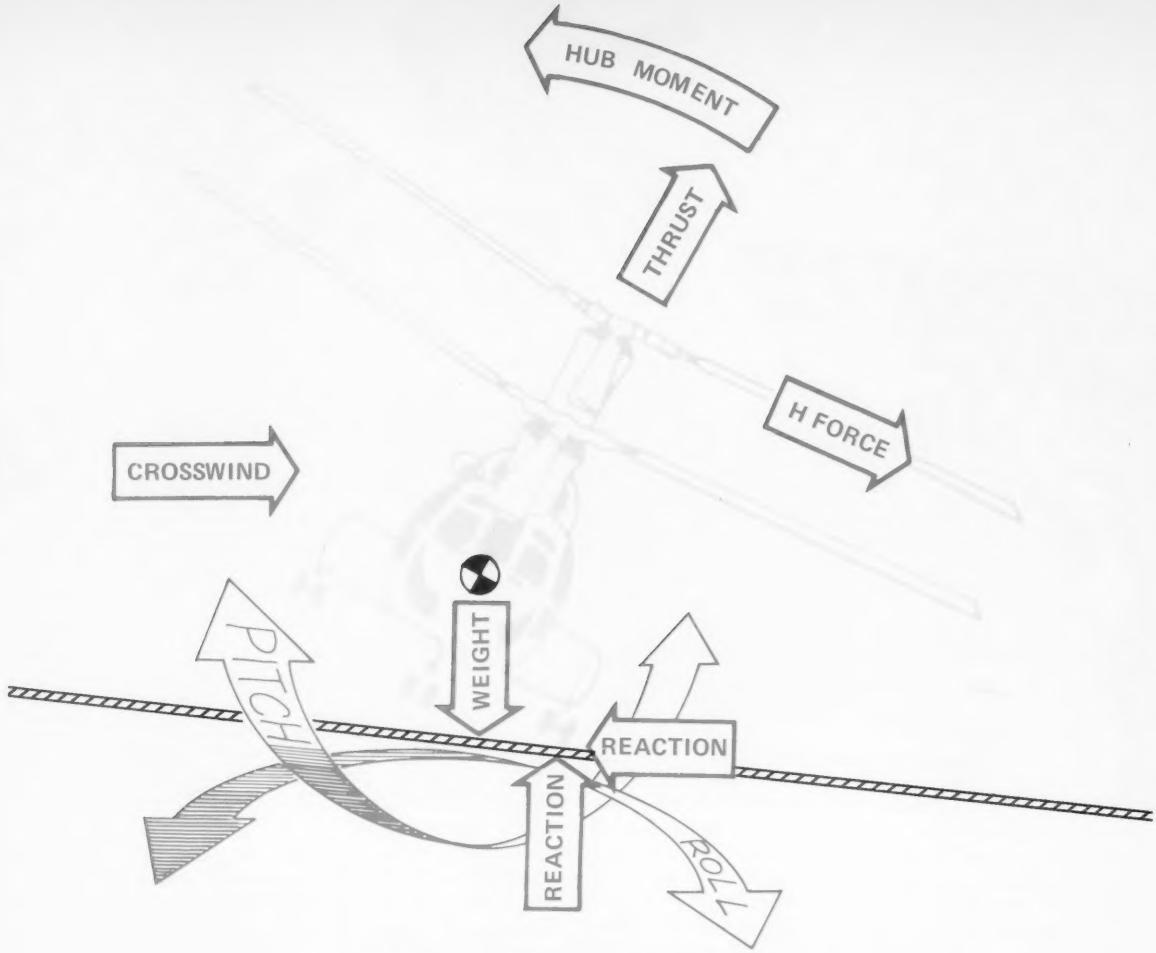


Fig. 1 — Rolling moments acting on shipborne helicopter.

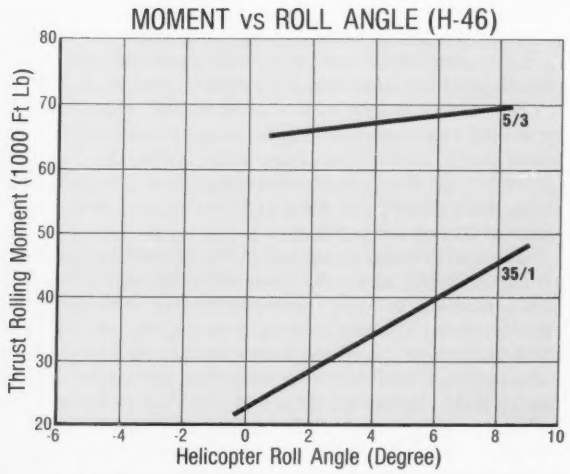


Fig. 2 — Rollover moment due to main rotor thrust for varying crosswind (5 and 35 knots) and collective pitch setting (3 degrees and 1 degree).

The primary contributor to the rollover, be it "wet" or "dry," is main rotor thrust (see Fig. 1). When describing "dry" rollover, the point is usually made that the problem most often occurs just prior to liftoff, when thrust and weight are about equal. In the case we've just seen, however, you'll remember that the collective was bottomed soon (within a second or so) after the start of the roll. The conclusion, of course, is that with the "aid" of the ship, the rollover can occur at collective settings much less than those likely at takeoff. Still, common sense suggests that lower collective means lower likelihood of this rotary-winged roll. Figure 2 shows the effect of collective setting for crosswinds of 5 and 35 knots. *Note that a 5-knot wind condition results in a considerably higher rollover moment at the 3-degree collective setting than does the 35-knot condition with collective bottomed to 1 degree.*

How about the influence of varied crosswind alone? The effects there are basically twofold. First, the increasing crosswind increases the thrust coefficient, thus providing more thrust-generated rollover moment (and it may enhance tail rotor thrust/rollover contribution on a single-rotor design

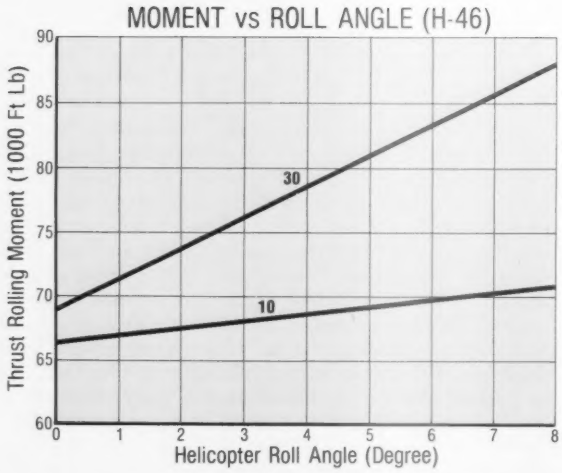


Fig. 3 – Effects of crosswind (30 knots and 10 knots) on thrust rolling moment at constant (3 degree) collective.

as well, depending on helicopter "nationality" and wind direction). Not only will wind increase thrust, it will also cause the tip path to "blow back" or tilt away from the wind, further increasing the likelihood of rollover. (Pure wind effects are shown in Fig. 3.)

A second consideration with respect to wind is the obvious pro-rollover parasite drag force that is incurred as the wind pushes on sideward helicopter surfaces. Rolling moment from this source can become quite high at higher wind speeds, a factor particularly critical to tandem-rotored helicopters, which present a large sideward area and, usually, high rotor pylons. Obviously, the crosswind is no less damaging when generated by sources other than mother nature. *In the case we read about earlier, the downwash (ultimately sidewash) generated by the helicopter departing Spot 2 increased the crosswind by nearly 25 knots!* (A plot of drag moment and wind speed is shown in Fig. 4.)

Some other factors suggested in Fig. 1 are H-force and hub moment. The H-force is an "in-plane" component of the rotor force resultant and may be thought of as rotor drag. Hub moment is an inherent moment generated through the combined effects of centrifugal force and the offset hinge design of most articulated rotors (or offset "virtual" hinges of hingeless rotors). Generally, these contributions to rollover are much smaller in magnitude than others discussed, with H-force usually providing a pro-rollover moment, while hub moment will increase or reduce rollover moment, depending on lateral cyclic input.

What about the ship's pitch and roll accelerations? Probably

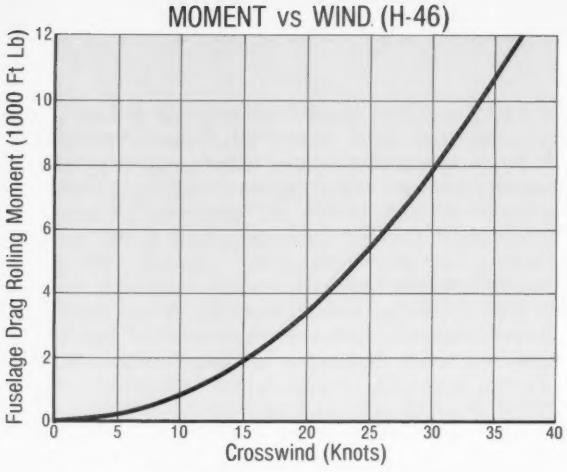


Fig. 4 — Fuselage drag moment vs. crosswind speed.

the most obvious effects are the apparent weight changes (G forces) which vary not only with angular acceleration but also with deck spot (distance from the metacenter of the ship). Clearly, positive pitching acceleration results in higher restoring moment, and vice versa. Angular accelerations of the deck in roll will virtually always increase the likelihood of rollover. Pitching accelerations which impose loads less than 1G also increase your chances for rollover, due in part to the apparent weight increase and to the thrust increase resulting from higher upflow velocity through the rotors.

This talk of deck accelerations should also include some consideration of deck surface conditions. Wet decks and degraded nonskid can add to the excitement of a moving deck, and that brings us to what should be the pilot's very best friend – *chains!* Properly applied, chains are the literal necksavers which can keep the helicopter on its spot and on its feet. *Improperly applied chains are worse than no chains, because they give the illusion of solution to the problem, while in the end, they may be an insidious part of the cause.*

What is a properly applied chain? A **tight** chain is a properly applied chain. (If the word "tight" just brought visions of ground resonance to your mind, let's make it clear that we're talking about a chain pulled taut to an axle tiedown and not to a mooring point located above the landing gear oleo.)

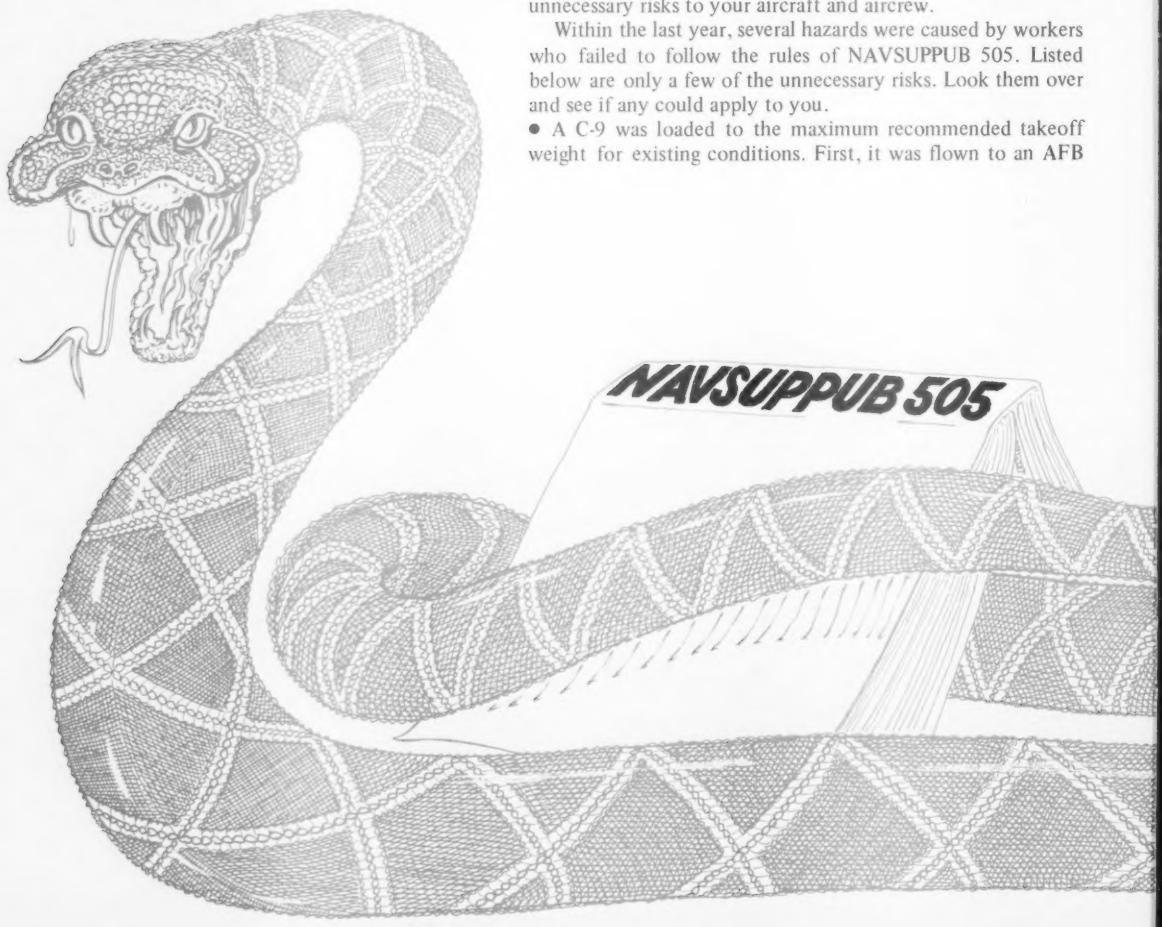
Consider a chain attached with 6 inches of slack to the axle-mounted hard point. For an H-46, this condition would allow an unrestrained roll of about 5 degrees (for a TD-1A shackled at its minimum-required, 4-foot length) if the aircraft were to pivot about the opposite gear. Our calculations indicate that a typically configured H-46 in moderately high crosswinds at sea state 4 aboard an LPH can roll through these 5 degrees in about half a second. As the chain is pulled from a slack to a taut position over a very short period, it is subjected to large, impulsive loads, loads that require vertical restraining forces on the order of 6,000 pounds if rollover is to be prevented. *This means that the axial force on the chain can easily exceed the 16,000-pound ultimate strength of a TD-1A and that it will fail!* If chains on the nose and opposite main gear remain intact, the aircraft may be in for a topsy-turvy ride. You may have read about just such an occurrence (one main gear unrestrained) in the September '79 *APPROACH*. In that case, the pilots sensed imminent rollover, pulled an armful of collective, and were fortunate enough to *break* the remaining chains and get airborne. Hats off to guys who save aircraft, but beware. In a more recent case, it appears that another pilot may have attempted to snatch an aircraft from the deck when he encountered an uncomfortable roll induced by a combination of ship's maneuvering and wind. The main chains broke but the nose restraints didn't, and the helicopter wound up first on its nose and then on its side. *The bottom line here, of course, is that sometimes you can break chains and sometimes you can't, but if they're put on right (tightly), you won't have to worry about it.* (Should you be forced to decide whether or not to try to break chains, "smart money" is on not breaking them.)

Over the past year or two, many suggestions have been made concerning how the risk of rollover may be reduced. These range from factors outside the squadron's immediate control, such as maneuvering limitations of the ship, to those within the unit's realm, such as collective rigging (to flatten pitch, i.e., higher autoturns). Pilot techniques, from reducing N_r (beeping down) while on deck to phased lateral cyclic inputs, have been suggested.

While each of these suggestions has merit, each presents its own set of additional problems. For instance, a rerigged collective would result in a lower thrust moment for a given wind/pitch setting, but it would also increase the likelihood of overspeed in autorotation. Reduced N_r has obvious benefits but does introduce an additional hazard in the event of a hasty liftoff. Lateral cyclic inputs to counter the rolling motion will decrease the rollover moment but will also increase the chance of droop stop pounding and reduce tip-path-to-deck clearance. Still, bottomed collective is highly effective and seems to be free of drawbacks. And while tight chains put greater demands on the blue shirts, they're guaranteed to prevent fling wing flip. ◄

SLITHERING INSINUATIONS

By LT Terry D. Nuss
VT-23



HAVE you ever heard the saying, "If it were a snake it would have bitten you?" Well, consider NAVSUPPUB 505 a diamondback rattler that, if disregarded, is going to sink its fangs in *deeply*. One of the Navy's most widely distributed publications, NAVSUPPUB 505 must also be one of our most widely forgotten or misunderstood guides when you consider how many mishaps have occurred from ignoring its established procedures.

Only by reading NAVSUPPUB 505 closely, learning the proper procedures, and executing them with care can the bite be avoided. And believe me, there's no antitoxin once a mishap (with LOX, for example) has occurred!

For those who are unfamiliar with this publication, NAVSUPPUB 505 is the instruction manual governing the preparation, weighing, and restraining of all types of cargo for air shipment. It lists everything that can be hauled as cargo and specific instructions on the preparation of each of these items. These restrictions and procedures were created in order to avoid mishaps, and failure to follow them can only create unnecessary risks to your aircraft and aircrew.

Within the last year, several hazards were caused by workers who failed to follow the rules of NAVSUPPUB 505. Listed below are only a few of the unnecessary risks. Look them over and see if any could apply to you.

- A C-9 was loaded to the maximum recommended takeoff weight for existing conditions. First, it was flown to an AFB

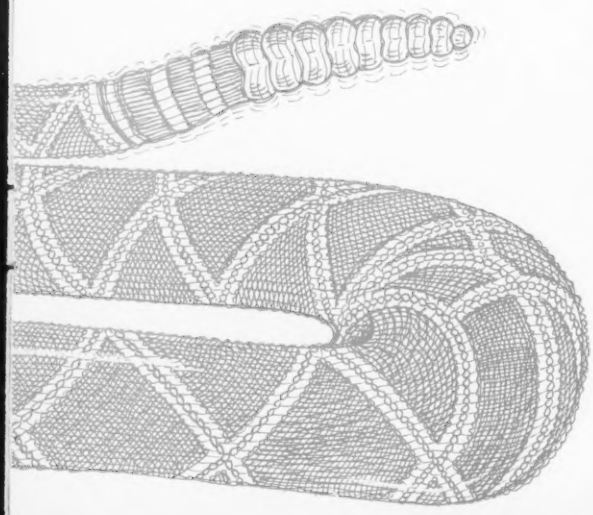
for a fuel stop. On departure from the AFB, the C-9 grossed out at 107,000 pounds. Later, when the aircraft was on final approach to its destination, the pilot noticed that he had full nose up trim and more was required. He raised the flaps to 25 degrees, which resulted in the trim moving off the full up limit by one-quarter degree. Fortunately, an uneventful landing was made.

In an attempt to find out why this happened, the cargo was reweighed. Not surprisingly, it was found to be *1,400 pounds heavier* than had been stated on the initial departure. This caused the aircraft to be over gross weight and out of the center of gravity limits.

Further investigation showed that the scale at the NAS had broken counterweights and had been improperly rigged for operation. Had an engine failed or any number of other problems occurred to add to the pilot's problem, a mishap would probably have resulted. Would this have gone on record as a crash of "undetermined cause"?

• In a similar situation of improper weighing, a loadmaster of a C-9 was observing the cargo loading of his aircraft at NAS West Coast. He noted that the manifested weights for five pallets were 2,200, 3,200, 3,500, 3,500, and 1,600 pounds, all nicely rounded-off numbers, eh? This caused him to question the weights, and he requested that all the pallets be reweighed. The actual weights compared to those estimated were:

ESTIMATED	ACTUAL	DIFFERENCE
2,200	2,725	+525
3,200	3,575	+375
3,500	4,025	+525
3,500	3,625	+125
1,600	1,975	+375
TOTAL		**+1,925**



Although the rounded figures were easier to add, the extra 1,925 pounds, added to an already max gross weight aircraft, could have led to a very serious mishap.

These situations could have been avoided if those responsible for the scale and loading the aircraft had exercised more caution. The problems resulted from improper weighing of cargo and could easily have been avoided if proper facilities had been used and care had been taken to ensure the job had been done correctly. Likewise, improper packaging or palletizing of cargo can be equally dangerous.

Another extremely dangerous situation (in direct conflict with the restrictions in NAVSUPPUB 505) is certifying that an article is properly purged without personally attending to the duty and being absolutely sure of the article's condition before transfer. This is evident in the following examples.

• A C-118 departed NAS Homebase with 35 passengers and three J-85 engines on board. After 45 minutes in flight, all three engines were found to be leaking hydraulic fluid, engine oil, and jet fuel into the bilges. These engines had been certified as being ready for shipment – without proper inspection. Result? An extremely hazardous situation.

• In another case, a C-118 was forced to abort a mission because of fuel fumes emitting from ground support equipment being carried as cargo. Postflight investigation revealed a small amount of fuel in three jet starting units and a gallon of fuel in a hydraulic test stand. All the equipment had been certified as "defueled." Although records showed that the certification was correct, the equipment was not defueled *properly*, in accordance with NAVSUPPUB 505.

• The most recent incident of improper certification occurred while baggage was being unloaded from a C-9 at an air station. One cup of JP-5, discovered in the forward baggage compartment, had leaked from an A-6 fuel control. Prior to loading, the loadmaster had noted that it was "correctly" bubble-wrapped and, again, had been certified "purged of fuel." Obviously, it was not!

There are many other cases of neglecting to follow NAVSUPPUB 505 regulations. A major one is the insufficient securing of cargo once it has been loaded on an aircraft. Another is deliberately including prohibited articles in boxes labeled "nonhazardous material." The potential hazard of these violations is both great and unnecessary.

Fortunately for all involved in the mentioned cases, no one was injured, and minimal damage occurred. Maybe **you** won't be so lucky. Shortcuts due to lack of time or ignorance of regulations are no excuse for jeopardizing the lives of the aircrew or passengers aboard an aircraft. If you're involved in the preparation, loading, or inspection of cargo, don't second-guess the rules. If you don't know the regulations, find out how to do it by asking someone who does. Better yet, pick up NAVSUPPUB 505, read it thoroughly, and find out for yourself. There's always a copy within easy access to you. Check with your operations department. Otherwise, that snake is coiled and ready to strike! ◄

LT H. J. Osborne
VA-86

IT started as a routine war-at-sea strike when aircraft from USS NIMITZ launched to raid USS EISENHOWER. LT Chuck "Bouncer" Osborne of VA-86 was a member of the strike's first element, led by CDR Dan Ryder of VA-82. After completing the highly successful strike, the flight made a high-speed, low-altitude egress from the target area and began a climb to altitude approximately 100 miles from NIMITZ. About this time, LT Osborne felt a severe vibration in his aircraft, combined with a loss of thrust, RPM, and fuel flow. He immediately set his power at 82-83 percent rpm, switched to manual fuel control, and extended the emergency power package (EPP).

Notifying the leader of his problems, LT Osborne began his return to NIMITZ, minimizing throttle movements to maintain maximum engine stability. CDR Ryder flew a wing position to keep an eye on things and notified the ship of their emergency. With severe engine vibrations continuing, LT Osborne began, from 50 miles away, a slow descent to the carrier. Engine instruments remained normal until 20 miles from the carrier, when the oil pressure began to fluctuate. CDR Ryder noted a stream of oil coming from the aircraft. At 15 miles, oil pressure indications dropped to zero and oil quantity indicated empty.

LT Osborne continued his descent, without adjusting power or speedbrakes, and set up from a high and wide abeam position. He delayed lowering the gear and flaps until reaching the abeam position, and then, avoiding abrupt throttle movements or attitude changes, he commenced his approach to the carrier. In this "chips down" situation, he flew an OK pass to arrestment on the No. 3 wire.

Postflight inspection revealed severe damage to the low-pressure turbine rotor blades and turbine exhaust case and a suspected engine main bearing failure. The engine oil reservoir was empty. LT Osborne's inflight actions under extremely difficult conditions enabled him to return a crippled *Corsair* that no longer desired to fly. His decisive actions most definitely saved a Navy aircraft.

LT H. J. Osborne

BRAVO ZULU

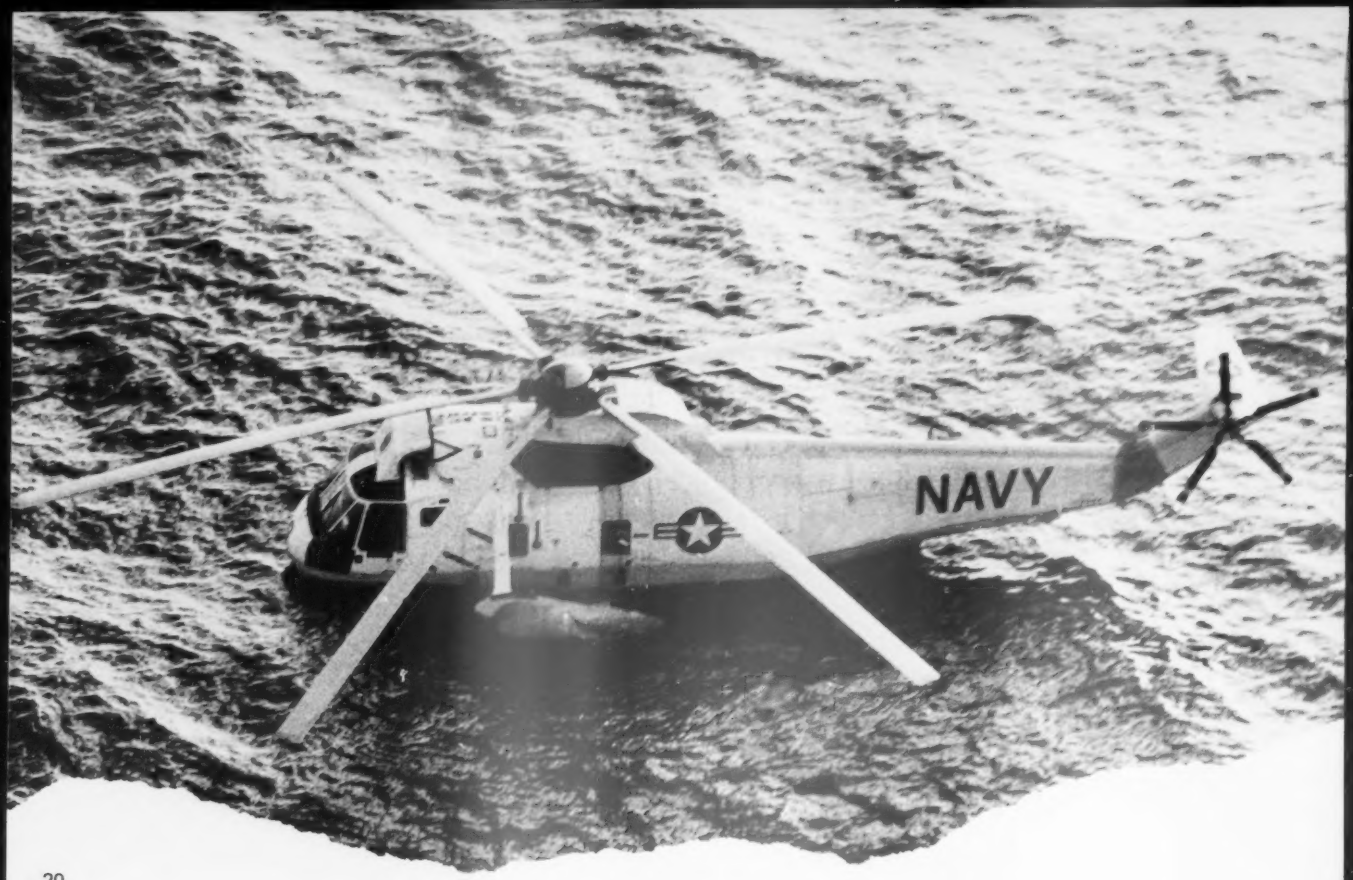
LCDR John Roberts (left), LTJG Ted Bach (right)

LCDR John Roberts
LTJG Ted Bach
VAW-126

IN the copilot's seat during a night carrier instrument landing, VAW-126's LCDR Johnny L. Roberts suffered a dual engine failure in his E-2C *Hawkeye* when in-close to the ramp. Despite many immediate problems caused by the loss of electrical power and uncommanded pitch and yaw inputs, LCDR Roberts expertly helped LTJG Ted Bach, the pilot at the controls, touch down in the landing area. The port engine somehow reignited upon touchdown and caused a violent swerve to starboard and a hook-skip bolter. Together, they were able to avoid ramming the numerous parked aircraft on the bow by using full left rudder.

As the *Hawkeye* settled off the angled deck, LCDR Roberts rapidly retracted the landing gear, reset the flaps for best single-engine performance, and took control of the aircraft. The E-2C was held in a slight noseup attitude as it settled into ground effect at an airspeed just below the single-engine control speed and 25 knots below single-engine climb speed. LCDR Roberts was able to tell from the clearly visible water surface that his rate of descent had stopped and elected not to make a controlled night ditching. His decision and perseverance were rewarded as the aircraft slowly gained airspeed, and by the time they were 3 miles ahead of the ship, the aircraft had gained enough airspeed to commence a climb out of ground effect.

After climbing to 3,000 feet, LCDR Roberts restarted the starboard engine, returned to the ship, and executed an OK approach to a successful arrestment. Although the cause of the dual-engine flameout cannot be positively determined, it is apparently another in the unexplained series of unsolicited RPM decay problems which has plagued the E-2 community. The superb airmanship and professional behavior exhibited by LCDR Roberts during this potentially disastrous situation not only saved a valuable aircraft, but most probably the lives of the crew as well. LCDR Roberts was awarded the Air Medal in recognition of this superb feat of airmanship. ◄



A Pat and

By Russ Forbush
APPROACH Writer

The story related below is not akin to the vintage Pat and Mike variety – there's no funny ending. On the contrary, it's a sad commentary on what can happen when aviation personnel fail to talk with one another until it's too late to prevent a mishap from occurring. There were many cause factors associated with this mishap, but numero uno was a lack of communications. Read on and you'll see what we mean.

WE'LL pick up the action on the night prior to the flight. An SH-3 was scheduled for a 0600 to 0800 "dawn patrol" mission the following morning. The HAC contacted his co-pilot and informed him that the flight would be conducted under EMCON. The copilot was somewhat apprehensive about the EMCON, navigation, and visibility restrictions associated with the mission, so he checked his NATOPS TACNAV operating procedures prior to retiring that night. The HAC had been briefed by his CO that maintaining EMCON during the flight was *very important* and, because of the expected poor visibility, care would have to be taken to avoid becoming lost. The HAC also reviewed his NATOPS TACNAV procedures before hitting the hay.

After rising the next morning, the copilot ate a small breakfast and the pilot ate nothing. At 0430, standard briefings were conducted by the SDO, CVIC, and the pilot. The briefed wind was 250 degrees, 18 to 25 knots. CVIC told the crew that EMCON "A" was in effect, and "after 0800, (they) could probably get someone to answer (them) on *Navy Red*." The frequency of *Navy Red* (covered UHF) was not briefed by CVIC, nor did the pilot or copilot ask for it. Still, both *Navy Red* and the new TACAN frequency were on the card of the day and carried by the SH-3 crew. The HAC was upset that CVIC did not brief the expected course and speed of the ship between 0600 to 0800 and that tower frequency would *not* be monitored (his CO had told him otherwise).

The dawn patrol mission brief by CVIC was for the H-3 to fly out 30 to 35 miles on a 090-degree bearing, then perform a clockwise circle at that distance to establish positions for other surface units in company with the CV. The HAC told the SDO during the crew brief that he intended to remain closer to the CV than briefed and would make frequent revisits during the mission because of the EMCON, navigation, and visibility restrictions. He was concerned with becoming lost and stressed that point in the brief and in discussions with the copilot. He also discussed the use of the Mk-6 plotting board as a navigation backup.

Preflight, start, systems checks, and engagement were all normal for the H-3. TACAN was set on RECEIVE. The copilot initialized the TACNAV system with launch and recovery latitudes and longitudes and a wind of 250 degrees, 15 knots manually inserted, as briefed by CVIC. Note that the air mass mode was used in TACNAV vice the doppler mode, since doppler is not authorized under EMCON "A." The air mass mode had not previously been used in this squadron. The H-3 lifted off at 0553 with 4,300 pounds of fuel onboard. (The *Sea King's* launch position was 13 nm east of the launch position briefed by CVIC.) After successfully completing the postmaintenance functional check-flight portion of the mission, the H-3 crew began the dawn patrol at approximately 0610. The HAC took up a heading of 092 from the carrier, at 120 KIAS, 300 feet MSL. Visibility was 3 nm.

When on top the CV, the copilot updated the TACNAV display and inserted fly-to-point 1 (FTP 1), 090 degrees, 30 nm from the "ship" symbol on the TACNAV. En route to FTP 1, the copilot used the Mk-6 plotting board to double-check the TACNAV course and groundspeed solution. Both matched. This was the only time the Mk-6 was used during the flight. No time and distance cross-check was accomplished by either pilot during the flight. The outbound leg to FTP 1 was flown for about 30 minutes at approximately 150 knots of groundspeed. The TACNAV visual display and "time-to-go" countdown indicated constant closing to FTP 1. The display intermittently flashed "99" but also continued to count down. Both pilots believed the TACNAV information was accurate and relied on it for positional data. Only the copilot operated the TACNAV during the entire flight.

Prior to reaching FTP 1, the copilot inserted FTP 2, which

Mike Story

was about 10 miles southeast of FTP 1. Shortly thereafter, the copilot entered FTP 3, and the H-3 was flown to the TACNAV "ship" symbol. When the aircraft arrived at that position, however, the ship was nowhere in sight. The HAC then terminated the dawn patrol in order to find the CV. The HAC flew several different headings during the next few minutes. At 0730, he decided to fly directly to the 0800-briefed recovery position, which had been inserted as "Datum" into the TACNAV upon initialization. The H-3 was flown on a heading of 090 degrees with 150 knots groundspeed until 0755, when it arrived on top the TACNAV "Datum" point. A 45-minute smoke was dropped on "Datum," and a search for the CV began within a 5-nm range ring inserted over "Datum" on TACNAV. Flying at 70 KIAS, the HAC orbited "Datum" from 0755 until a TACAN lock-on, when the carrier was received at approximately 0915.

Meanwhile, back on the CV, people were now concerned about the H-3. At 0810, the SDO asked Air Ops when the H-3 would return and was told, "30 to 40 minutes." He didn't tell the SDO that he had extended the flight an extra hour, nor had he told the aircrew. Between 0750 and 0830, the OOD, JOOD, TAO, and assistant air boss questioned Air Ops on the overdue status of the helo. At 0850, the squadron CO arrived in the tower and advised the air boss that the aircraft had only about 35 to 45 minutes of fuel remaining.

The H-3 crew transmitted "0 plus 40 fuel" over a tower uncovered frequency button at 0903. The air boss copied, and the bridge gave permission to break EMCON. A SAR alert H-3 was launched at 0923, and at 0925, it established communications with the lost H-3. At 0927, the troubled H-3 broadcast "Low fuel light, preparing for water landing." Minutes later, the H-3 made a controlled dual engine water landing on the 090-degree radial, 87 nm from the CV. Both fuel low level lights were on at the time. The engines were shut down, and the crew egressed the aircraft. The helo remained upright for about 1 hour before rolling inverted. The uninjured crew was picked up by the SAR H-3 and returned to the carrier at 1107. Attempts by the CV to salvage the H-3 were unsuccessful, and the aircraft sank at 1532 in 1,400 fathoms of water.

While there were a number of factors involved in this mishap, it's apparent that they all, in one way or another, evolved through a strong lack of communications between the participants. Let's review them:

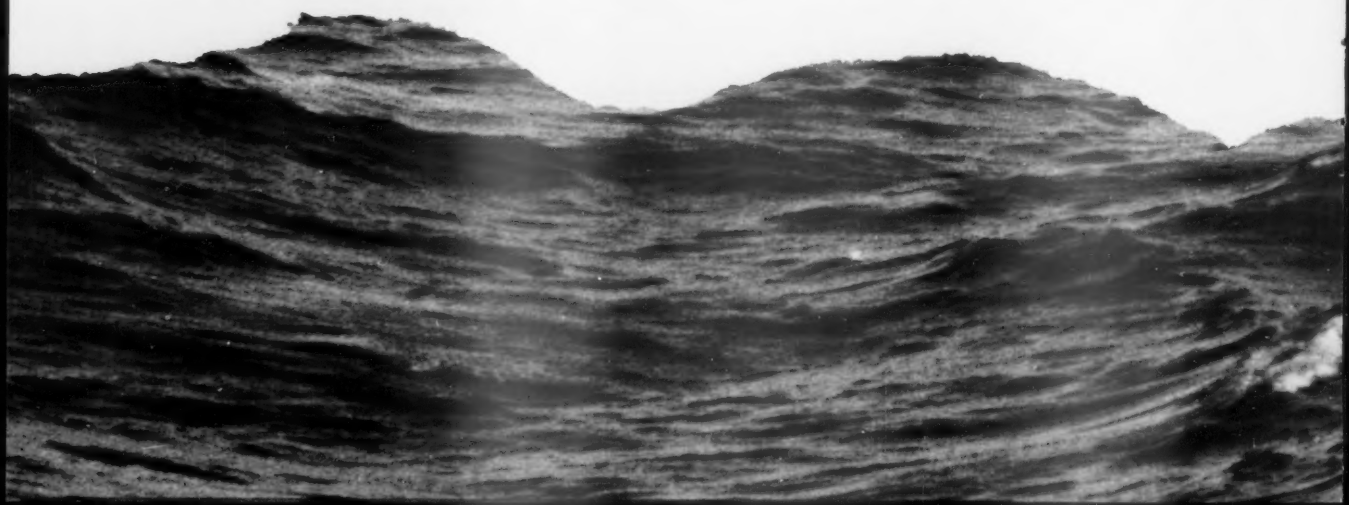
First of all, the HAC was very concerned about the EMCON, navigation, and poor visibility restrictions. In spite of this, from the very beginning, he failed to ask questions and get answers. When he didn't receive the *Navy Red* frequency during the CVIC brief, he never asked for it. In fact, he didn't even know that that frequency and the new TACAN frequency were on the card of the day – which was in the aircraft.

Crew coordination was at a standstill. Neither of these pilots had flown together before, but little effort was expended in preplanning the mission. They used improper navigation technique by failing to use the briefed forecast winds (15 knots vice the forecast 18-25 knots), failing to perform time and distance checks to verify TACNAV accuracy, and flying twice as far from the ship as they thought they had. This reflects a lack of basic understanding of navigation procedures.

The air ops duty officer extended the mission recovery time without notifying the aircrew or squadron. While the versatility of the helicopter is well known, and many missions are extended, this flight was being flown under EMCON "A" and should not have been extended without the approval of those involved. Air Ops also erred by giving the crew an incorrect ship's position on takeoff and by not briefing the *Navy Red* frequency and emergency procedures.

All watch officers failed to implement aircraft overdue procedures in a timely manner. Had proper measures been taken at 0800, when the helo was overdue, the H-3 could have been recovered safely.

In the final analysis, the HAC was his own worst enemy. His skipper had briefed him on the importance of maintaining EMCON, and come hell or high water, he was going to stand pat and unyielding in his intent not to pick up his mike and break EMCON. This Pat and Mike approach cost the Navy an SH-3 aircraft. The failure of the crew to communicate their problems was perhaps based on a desire not to jeopardize the success of the exercise. They apparently failed to realize that the requirement to communicate an airborne emergency far outweighed the exercise constraint to maintain radio silence. While it may be imperative in a wartime environment to preserve security, the loss of a single aircraft for failure to communicate an emergency in this instance cannot be justified. It's incumbent upon commanding officers, department heads, and other experienced aviators within squadrons to demonstrate and enforce rigorous flight discipline and to place in *proper perspective* the relative importance of the success of each evolution. ◄



"I heard the engines wind down, the ground came rushing up, and at the last moment, I leveled the nose to land on all three gear."

MISHAP

on the cactus moonscape

The following article is written in first-person narrative in order to better illustrate the sequence of events.

By LT Colin W. Sargent

I GLANCED at my copilot, who was eyeballs down on the VFR sectional. We'd been flying for 40 minutes now, keeping to the left of a mountain range after leaving Desert AFB, our second-to-last stop before destination. Still monitoring the AFB's departure frequency, we reached a valley between two adjacent shoulder lines, and I passed the controls to the H-2P at 125 knots, 1,000 feet AGL.

The afternoon was softening into a blue Southwestern evening.

The seven souls onboard our CH-53D *Sea Stallion* were about to get bushwacked.

"Now let's see," I thought as I unfolded the sectional onto my lap. "We're passing above a small village, elevation 1,900 feet MSL, and we'll cross the mountains over that

saddle, 4 to 5 miles ahead, where the slope dips from 4,500 feet to 3,000 feet MSL."

With the same thought in mind, my copilot added power to begin a gentle, 500 foot-per-minute climb in order to clear the upcoming barrier.

Suddenly, washing machine-like oscillations shook the helo with a one-per-rev beat. The vibrations were visibly transmitted through the cyclic, which began to move left and right in a narrow, eliptical path.

For a second, we thought the oscillations were nothing more than turbulence from the mountain wall directly in front of the helicopter.

For a second, we caught our breath.

But things got worse. Believing the oscillations might be pilot induced, I took the controls. The copilot threw up his hands, indicating complete transfer, and I flew the aircraft for a few moments, cupping the stick with my thumb and index finger. I knew immediately that we had a mechanical malfunction on our hands. There were no caution lights shining, but the N_f and N_T needles caught my eyes, with N_f turns oscillating between 95 and 105 percent, "chased" an instant later by the N_T needle.

I reduced power and began a gentle turn to the right for terrain clearance. With the saddle now about a mile away, a high-pitched whine started from the main gear box. As power was reduced, the oscillations decreased. I rolled out after 180 degrees of turn and noticed I was at 3,200 feet MSL, 700 to 800 feet AGL. With each increase of power, the lateral vibrations became more severe and the noise became louder, crescendo and decrescendo in time with the oscillations.

My first intention was to fly the helo to level ground in the center of the valley, 6 or 8 miles away, but the oscillations increased alarmingly, and I decided that I was in such an *extremis* situation that I had to land *now,* in the best possible spot in the rocky terrain below. My crew chief agreed in the strongest terms with my decision to land ASAP. I briefly considered a running landing, but the terrain wouldn't permit it. Saguaro cacti and a sharp, oblique aspect covered everything.

The copilot flicked IFF emergency, I yelled "Get the gear!" and a pilot (passenger) sitting in the jump seat slammed the gear down and went aft to strap in. Moving aft was difficult, because he was thrown back and forth in the cabin, bouncing between some internal cargo and the side of the aircraft. I asked the copilot to smoothly increase turns with the speed levers, aimed for a spot relatively free of cacti, and wrestled the helo as gingerly as I could toward a no-hover landing. Our crew chief, on a gunner's belt, was talking me down all the way. I'd wanted to pause for an instant to inspect the touchdown spot before landing, but found, when reaching hover altitude with a degraded rotor system and surging engines, that full up collective did not stop the descent.

I heard the engines wind down, the ground came rushing up, and at the last moment, I leveled the nose to land on all three gear. We hit pretty hard, and on touchdown, I immediately reached for the speed levers. We began a spin to the right, and with the levers off, I fought to maintain the aircraft level.

We may have bounced slightly after impact, and we slid right until coming to rest with the fuselage at right angles to our original, easterly heading. I didn't know it at the time, but when we hit, the tail section separated and made a full half circle, coming to rest 30 feet from the fuselage.

Exit was delayed because the rotor blades were slow in coming to a stop, but when we did leave the helo, we did it in an orderly fashion. Everyone left the aircraft through the main door except the copilot, who exited through his cockpit window. I quickly counted heads, was one man short, and ran back to the helo, only to see the missing man, the copilot, cross in front of the aircraft. The time was 1640 local. Waiting at a safe distance, we let the helo cool down a bit. I felt strange looking at our dark green tail rotor lying astonishingly separate on the desert floor. The gawking cacti stood vertically all around the "moonscape."

After the dust settled, we climbed up to inspect the rotor head. Spray patterns of hydraulic fluid on the blades and rotor head cover assembly told the story. Our No. 2 damper hydraulic line (PN 65106-71120-042) had ruptured in flight from internal pressure, and nearly all hydraulic fluid in the damper accumulator was gone, as the "extended" accumulator pin readily testified. As a result, we'd lost damping on all six of our blades. This produced a surprisingly violent and progressively increasing lateral oscillation which was aggravated by any change in power or attitude.

The complete loss of damping in our elastomeric rotor head shook our helo far more than I'd ever been led to expect from readyroom discussions. We'd been vibrating right at the gray edge of "controlled flight."

Damage to the aircraft? I was looking at a broken tail, two damaged main rotor blades, and three crunched landing gear. The cost turned out to be nearly half a million dollars!

Though we hadn't been using TACAN because of the low altitude, we knew our location from our VFR sectional. I pulled out my PRC-90 and transmitted an emergency call with our estimated position. Waiting for the SAR helo, we stood like blind particulars in the desert's high contrast. Finally, we were picked up as darkness was setting in. Two pen flares and a hand-held flare were used to guide the rescue chopper.

This material failure wasn't the visible kind we could have identified even with the most meticulous of preflights. Still, I learned what a total loss of damper effect can do to a CH-53 pilot. That's a valuable lesson in itself, and anyway, we were all safe.

We stacked our gear and thanked our lucky stars. It gave us a lot to think about on the long ride home . . . ◄

Mindoro H-2 scare

LT Jeff Lee
HSL-31

IT was August in the Philippines, where storm ceilings drop and rise like hemlines during the monsoon season. Our ship was 16 miles off the coast of Mindoro Island, and we'd just finished preflighting our H-2 for a seemingly uneventful cross-country.

Our mission planning was thorough and included a flight plan sent by message, a weather brief on en route conditions

from Air Force forecasters (received via HF radio), and an extremely detailed chart showing our route of flight.

We were expecting an overcast ceiling with occasional rain showers. With 3 hours of usable fuel on board, we figured we'd reach NAS Deep Green in 1 hour and 45 minutes at max range airspeed.

After takeoff, we could easily see the island rising in the distance out of the ocean. It was about 5 hours before sunset. Climbout and leveloff were normal. As the flight progressed, we started to lag behind our checkpoints. Both the HAC and I noted this, but we decided to keep going, because even if the winds turned against us, we'd still have plenty of fuel. By now, we were 40 miles north of the ship and had radio communication with both the ship and the AFB on HF radio.

The weather got worse, swooping down from its initial 3,000-foot ceiling to 700 feet. Since our ship was a hydrographic survey vessel, unequipped with TACAN (and we were out of range of other TACAN stations), we were flying VFR with only ADF to guide us.

We decided that if the weather got any worse, we'd turn around and head for home. We entered a rain squall that started as a drizzle and steadily worsened as we continued. The HAC and I agreed that things were starting to look bad, so we tried to raise the ship on HF and VHF. Neither radio was working properly, so we transmitted in the blind our position and difficulty with en route weather. At this point, we didn't know exactly where the ship was, and since the storms behind us seemed worse than the storms ahead of us, we pushed on.

In order to stay VFR, we had to descend to 150 feet AGL, and visibility was down to one-half mile or less. Fortunately, my navigation had plotted us right over a local airstrip (it looked like a river from the air). We decided that, with weather deteriorating, the only safe thing to do would be to land and wait for the skies to clear. Our ceiling over the airstrip was 100 feet AGL, and we could only see directly below us, so we were indeed lucky to find it. As we circled, we again tried to reach the ship on HF radio. We later learned that the ship had heard only that the helo was down safely; the rest of the transmission was garbled.

After shutdown, we made our way to a shack, the only building on the site. An islander there made a radio call to the AFB to have them relay to NAS Deep Green that we wanted to close out our flight plan because we were safe on deck and waiting for the weather to break.

The weather stayed the same for the rest of the day. We spent a wet night in a barn. The next morning, the weather had improved, so we preflighted and tried to start on battery power. After three tries, we decided that the battery was too weak, since it kept dropping all power off the line on starter engagement. Finally, one of our stalwart young crewmen found that the cables from the battery were corroded. After the terminals were cleaned, we started the engines easily, and soon we were airborne. We accelerated back to max range airspeed and headed for Deep Green. Clouds started moving in, and before we knew it, bang, we were inadvertently in IFR conditions.

Vertigo. I felt as if we were in a left turn with a nosedown attitude. I informed the HAC, who was already on the gauges, and he came on the controls with me until we both had a good scan going. Next, we slowed down to max endurance airspeed.

After 15 more minutes, the windshield wiper on my (co-pilot's) side sprang a massive hydraulic leak. Again, our bad and good luck seemed to intermesh – though there was no airstrip nearby, there was a sizable town directly beneath us. The leak required an immediate landing. It was raining fairly hard, but we secured our windshield wipers until turning final so we wouldn't deplete our hydraulic fluid. Our landing zone was a large parking lot. Because of debris at the edge of the LZ and nearby houses with loose tin roofs, we used a steep approach. Using the windshield wipers sparingly on final, we landed safely. After shutdown, our crewmen trudged off to try and find some materials to block the leak, while the HAC went to look for a telephone to call Deep Green again. I stayed with the aircraft to guard it from the dozens of curious children who'd flocked around us almost before we could stop our rotors.

After 30 minutes, our maintenance crew returned with a bolt and some *Teflon* tape purchased from a local hardware store. Using the bolt wrapped with the tape in the threads, they plugged the windshield wiper's hydraulic lines. We preflighted again and crossed our fingers as the helo turned up. The bolt stopped the leak, so we took off and climbed to altitude. By now, fuel was becoming a major concern because of all the unscheduled stops and starts and our slow progress the day before.

We finally arrived at NAS Deep Green 50 minutes later, with 290 pounds of fuel left (15 minutes worth). Several things came to light after we landed and our ship pulled in. First, we found that 20 minutes after our departure time, the ship had encountered over 50 knots of headwind. This accounted for our slow progress and, coupled with our two unscheduled stops, caused us to use 40 minutes more fuel than we'd planned. Next, we learned that NAS Deep Green had never received our flight plan from the ship's radioman, so even if we'd gone down, no SAR effort would have been initiated. Finally, though we were both pushed to our limits, we always had a viable alternative available, *to land,* which kept the helo safe throughout this difficult flight.

Those precautionary landings could have saved our lives. I guess I'll never really know. What I do know, however, is this – no matter how routine a mission appears, it's best to always have an out, because if you depend upon luck alone, you might run out of Deep Green islands to land on! ◄

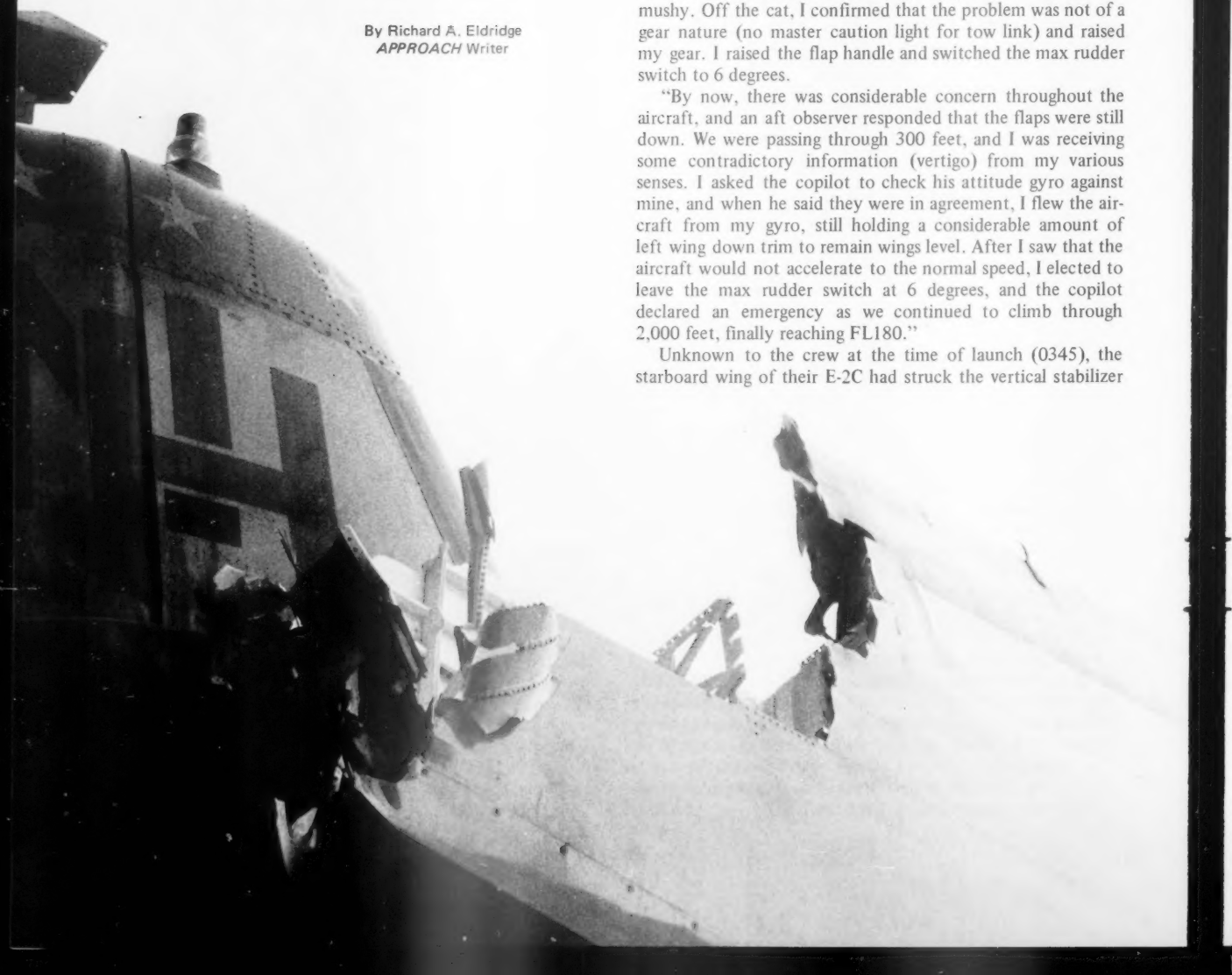
Hawkeye with

By Richard A. Eldridge
APPROACH Writer

"THE catapult officer touched the deck with his flashlight, and the cat stroke began. About three-fourths of the way down the track, there was a loud bang as I set the takeoff attitude of 10 degrees nose up on the attitude gyro. Once the shot was completed, I noticed that to remain wings level, it required considerable left wing down control input. My initial thought was that the load limiters had somehow jammed and the ailerons were not working as expected. They felt very mushy. Off the cat, I confirmed that the problem was not of a gear nature (no master caution light for tow link) and raised my gear. I raised the flap handle and switched the max rudder switch to 6 degrees.

"By now, there was considerable concern throughout the aircraft, and an aft observer responded that the flaps were still down. We were passing through 300 feet, and I was receiving some contradictory information (vertigo) from my various senses. I asked the copilot to check his attitude gyro against mine, and when he said they were in agreement, I flew the aircraft from my gyro, still holding a considerable amount of left wing down trim to remain wings level. After I saw that the aircraft would not accelerate to the normal speed, I elected to leave the max rudder switch at 6 degrees, and the copilot declared an emergency as we continued to climb through 2,000 feet, finally reaching FL180."

Unknown to the crew at the time of launch (0345), the starboard wing of their E-2C had struck the vertical stabilizer



a clipped wing

the story behind the Bravo Zulu

of a KA-6D spotted on the port side of the bow, *beyond the foul line*. They didn't realize the extent of the damage to their aircraft until 15 minutes after reaching FL180, when sunrise provided sufficient light to assess the damage to their starboard wing. Approximately 4 feet of the leading edge and 6 feet of the trailing edge of the wing were missing, and one aileron actuator was gone. The pilots decided that as long as the E-2 had not lost hydraulic pressure and had two good engines, they could wait until daylight to make their carrier landing rather than attempt an emergency night recovery. After sunrise and some slow flight checks, the E-2 was recovered without further incident.

Before the launch, the flight deck chief (FDC) had told the flight deck LPO to check the 4-row on the port bow to ensure that no exhaust gases were directed toward the launch area and all aircraft were clear of the shot line. When the flight deck LPO arrived at the 4-row, he found a KA-6D (with one engine turning) directing its exhaust toward the launch area. He informed the *Intruder* pilot that he had to either shut down or start the other engine and taxi clear of his spot. The pilot elected to start the second engine and taxi clear.

Meanwhile, the FDC was directing the *Hawkeye* as it taxied forward to be catapulted. He handed off the E-2 to the catapult No. 3 spotter and then walked along the shot line toward the bow. As he reached the forward end of the angle deck, he noted the KA-6D's exhaust fouling the launch area. He also noted a green status light for catapult No. 3. Unable to find the bow safety man, he went back into the launch area to give a "hold launch" signal to the No. 3 catapult spotter, who acknowledged the signal. Next, the FDC proceeded to the KA-6 to assist in clearing it from the launch area so the E-2 could be catapulted.

Shortly after the FDC disappeared in the 4-row, the catapult spotter saw a tow tractor enter and quickly depart from the launch area aft of JBD No. 2. The catapult spotter assumed the tow tractor's entry and exit in the launch area was the reason for the "hold launch" signal.

During this time, the flight deck LPO determined that the KA-6 had to be backed up in order to gain maneuvering room to taxi clear of adjacent aircraft. A tractor and tow bar were attached to the KA-6, and the aircraft was backed across the shot line, further fouling the launch area. The FDC stood on the starboard side of the KA-6 to ensure the aircraft was moved safely. While the *Intruder* was being moved, the flight warning alarm sounded. (Air department SOP states that the alarm will be sounded 30 seconds prior to launch.) In later interviews with flight deck personnel, many stated that they associated the sounding of the alarm with **2 minutes** to launch. At the alarm, the flight deck LPO ran to where the catapult No. 3 bow safety man should have been stationed to inform him to foul the shot line, but he couldn't locate him. The LPO was one of the individuals who was convinced that there were 2 minutes to go before launch. He returned to the KA-6D, unhooked the tractor, and moved the tow bar to straighten the nosewheel before taxiing the aircraft forward to clear the shot line.

Simultaneously, the catapult officer gave the tension up signal to the E-2 after he noted the green rotating beacon on the island (indicating clear to launch). The catapult spotter checked the shot line and also noted a green status light from bow safety. He never received an "all clear" signal from the FDC, who had earlier given the "hold launch" signal. Due to darkness, the E-2 crew, on the catapult and in tension, could not see the tail of the KA-6D extending beyond the shot line. The E-2's external lights were turned on, indicating ready for launch. As the E-2 was catapulted, the starboard wing struck the vertical stabilizer of the KA-6D.

It's easy to get strangled by a chain of events. A catapult spotter assumes that he knows why he's received a suspend signal and believes he has a clear deck (though not given an "all clear" signal). A safety man does not look forward and feels the safe shot is clear. (It always is, isn't it?) A flight deck chief is certain that one signal will stop the launch, and a flight deck LPO moves an aircraft past the safe shot line, confident that he has enough time.

"And we all fall down."

Compounding these communications problems, this evolution took place during an EMCON exercise which required that the SRC-22 "Mickey Mouse" ears used by flight deck personnel be *turned off*. Having these units turned off is tantamount to having aircrews conduct night carrier operations with intentionally secured radios – there must be a better way to conduct business!

Without question, the entire E-2 crew deserves a lot of credit for bringing their aircraft back safely. (*Hawkeyes* don't fly quite as well when their starboard wings are 4 feet too short!)

One final thought. Wouldn't it have been nice if, through proper flight deck procedures, these fliers had never had to learn they were capable of this kind of heroism during peacetime? It's terribly hard to tell good sea stories when your heart's in your mouth . . . ◄

BEST LITTLE AIRPORT IN SOUTH TEXAS

By the VT-23 Safety Department

IT was a clear, beautiful afternoon in South Texas on 19 January 1982, a typical big "X" day for the CNATRA warriors whose T-2s and A-4s fly from before dawn until way past dusk, when the last night fliers land. In the VT-23 readyroom, ops were normal as the FDO scanned the weather screen, which was calling South Texas at 1,500 feet scattered with 5 miles visibility in haze. Quickly reviewing the schedule board, the FDO concluded that the weather was a lieutenant j.g.'s night (no moon) and good enough for his anxious night solo students. So, with finality, he screamed "Launch the night fliers!"

In the midst of the prospective night solo fliers was the duty night chase instructor, LT Rex Schildhouse, wondering whether or not he wanted to finish his soda. With the go-ahead from the FDO, LT Schildhouse gathered his chicks for another routine, thorough brief. He thought about making it a short brief (*such a great night, what could happen out there*). But, as NATOPS Officer, he discarded that idea and held a comprehensive brief, including a question and answer period with his students. He covered every "what if" problem his students might encounter, including weather divert situations.

After the brief, the pilots turned to the FDO for their aircraft. The lineup went like this: LT Schildhouse was in the front seat of 370, with ENS Dave Dykoff (an instructor under training) in the rear; 371, 2d Lt Buck Lynn, solo; 372, ENS Bill Good, solo; and 373, ENS Ben Gillian, solo. Weather was checked one final time with no changes reported, and the crews manned their planes at 1700 local.

The preflights, starts, check-ins, clearances, and taxis were uneventful. The ATIS was calling the current weather 25,000 scattered, 7 miles visibility. At 1830, all solos were up and ready for launch at the hold short. The chase plane, 370, was cleared for takeoff on runway 13R, followed by the three solos at 1- to 3- minute intervals.

As 371, piloted by 2d Lt Lynn, reported airborne, LT Schildhouse spotted a low cloud layer or fog bank sneaking toward the southwest corner of the airfield. As 372 called for takeoff, LT Schildhouse broadcast to NAS Kingsville Departure Control to cancel 372 and 373. Now confusion reigned for both ground personnel and the two cancelled solos. No one could comprehend the order to abort on a night that seemed tailor-made for flying. Meanwhile, at the controls of 370, ENS Dykoff maneuvered to remain VFR and keep 371 in sight. As the two planes continued their climb and began an arc back to the VFR initials, the crews started dumping tiptank fuel to reduce weight for landing.

When the NAS Kingsville Approach watch supervisor received a new weather report, he realized why the solos had been cancelled. Kingsville Approach then relayed the updated weather information to 370 and 371.

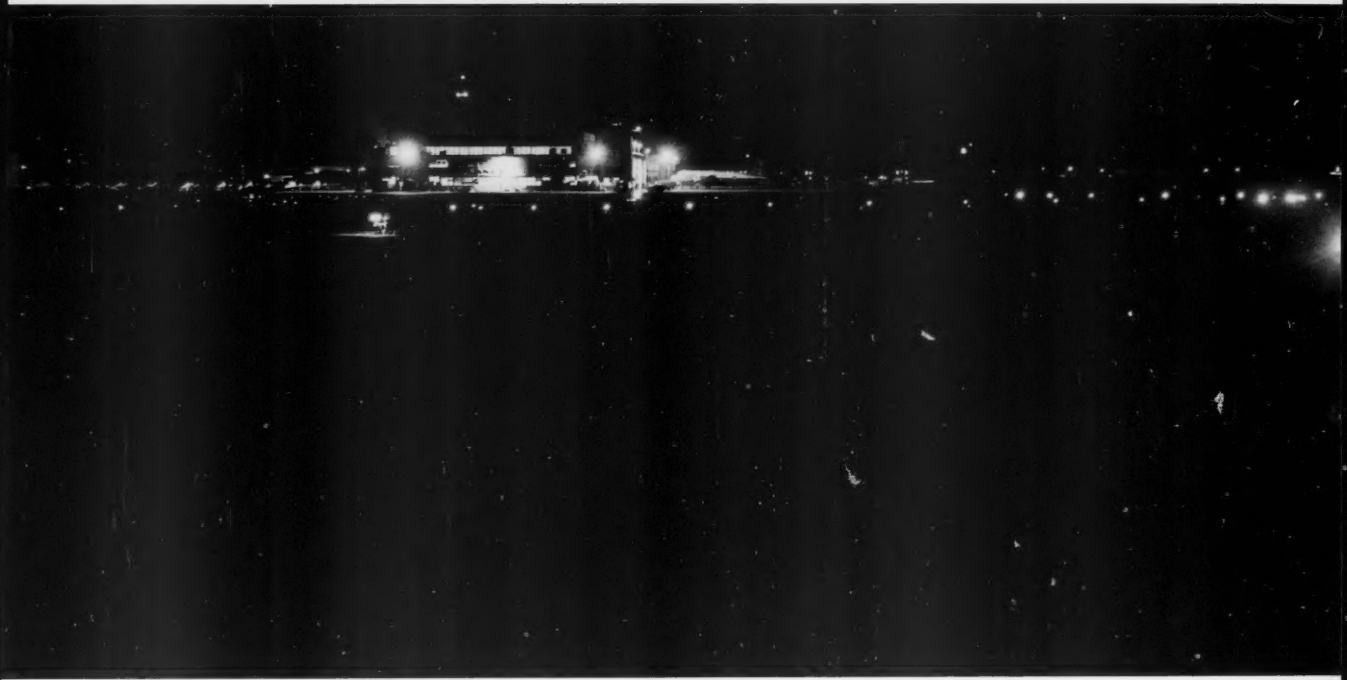
"Navy Corpus is closed due to fog, Navy Chase weather is 800 feet overcast with 4 miles in fog and decreasing rapidly."

Additionally, the nearby San Antonio air force bases were now marginal VFR (less than an hour earlier, they'd been clear with unrestricted visibility). When they heard this report, the pilots immediately realized the possible need for every drop of fuel remaining. Tiptank dumping was secured.

The FDO and tower were now reporting that fog was rolling in at home field. LT Schildhouse requested a straight-in approach with radar glide slope information to provide a descent profile until ball acquisition for the noninstrument-rated pilot of 371. 370 (chase) then joined on 371 as prebriefed, with 371 in the lead. Landing checks were completed on a 10-mile base leg. Aboard 370, LT Schildhouse briefed ENS Dykoff to establish an instrument scan and call out any abnormal altitudes or airspeeds for a GCA while he held a constant position on 2d Lt Lynn, matching his altitude and angle of bank.

Ahead of 370 and 371, a TA-4, on a weather divert from NAS Corpus Christi, landed at NAS Kingsville. He reported seeing the field at one-half mile, and Kingsville Tower concurred that they were unable to see the TA-4 until approximately the same distance. Consequently, Kingsville Approach informed the crews that NAS Kingsville was now closed to the noninstrument-rated solo student, 2d Lt Lynn, in 371.

Quickly assessing the situation, LT Schildhouse then requested a surveillance approach to Kleberg County Airport, located 14 miles west of NAS Kingsville. Kingsville Approach issued the two aircraft vectors to the 6,000-foot long, 75-foot wide, hard-surfaced runway with lighted edges, high-intensity threshold, and VASI-equipped airfield. Everyone saw the



Kleberg runway immediately upon turning toward the field, and there were no obstructions to visibility.

LT Schildhouse remained as wingman while the Kingsville Approach controller, Mr. Geise, gave recommended headings and altitudes into the airport. The information supplied to 2d Lt Lynn was accurate and calming, and fortunately, 2d Lt Lynn was somewhat familiar with Kleberg County airport since he'd shot practice surveillance approaches there before. These factors helped 2d Lt Lynn make a safe, VASI-assisted landing followed by LT Schildhouse and ENS Dykoff, just 25 minutes after their takeoff from NAS Kingsville.

The cards of fate dealt that night were the best possible in a bad situation.

2d Lt Lynn had flown his night-fly safe-for-solo check the night before with LT Schildhouse and had also flown 200 hours as a private pilot. He was therefore familiar with the workings of VASI and civilian facilities. In addition, LT Schildhouse's quick thinking and action plus the help of the crew at NAS Kingsville Approach were all instrumental in the successful outcome of the ordeal.

Just another WOXOF night in South Texas . . .

The calm and rapid adjustments made by all parties to the quickly deteriorating situation led to a closing scene that won't easily be forgotten. They will always carry the memory of two T-2s secured for the night and the crew, with broad smiles bursting with relief from a job well done, enjoying a cold drink at the Best Little Airport in South Texas. ◄

LETTERS

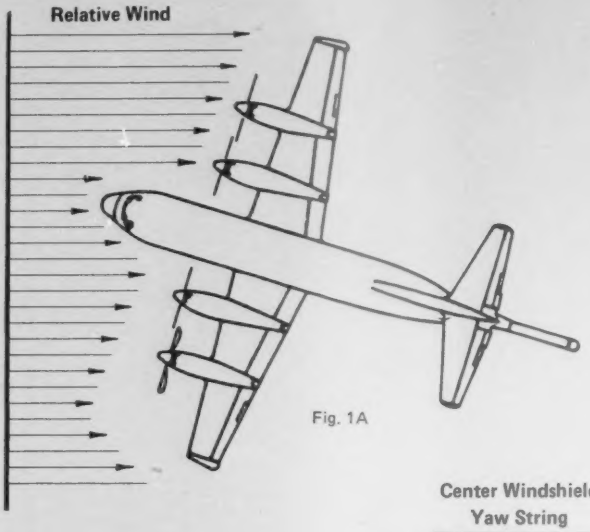


Fig. 1A

Yaw String Swing

Point Mugu, CA – Congratulations to LT James J. Miller for his well-written article, "Engine Failure and V_{mc} (Air) in Multiengine Aircraft," in your FEB '82 issue.

Figure 1A illustrates how the nose of a four-engine aircraft in balanced flight with the No. 1 engine failed is actually to the right of the relative wind. This illustration may at first seem to be in error, since the nose of a four-engine aircraft with the No. 1 engine out obviously has a tendency to move to the left. Figure 1A is, however, correct and is the result of an application of right rudder, which causes the yaw string in Fig. 1D to streamline up and to the right on the center windshield.

I am curious to know whether or not LT Miller actually attached the yaw string to the center windshield of his P-3 during his flight tests. If so, I'd also be curious to know if anyone has ever considered experimenting with a yaw string during three-engine loiter operations to determine what effect balanced flight may have on P-3 endurance.

CDR William J. Rakowski
VTU-7676

● In reference to your questions, yes, we did attach a yaw string to the center windshield. We didn't attach it as indicated in the diagram. We used a 10-inch piece of parachute line and taped it to the lower center windshield frame with a piece of ordnance duct tape. I drew the reference line with a grease pencil. We couldn't put the tape directly on the windshield due to the heat involved. I drew the diagram that way so it would be easier to see what it was, as many fliers are unfamiliar with a yaw string.

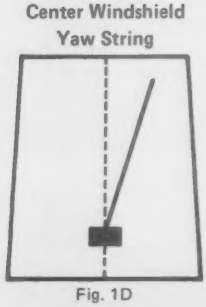


Fig. 1D

We flew two flights with the yaw string attached. What we found was that, under any flight condition of asymmetric power (i.e., waveoff, max range, loiter), the P-3 is more efficient in centering the yaw string and accepting varying degrees of ball out toward the operating engines. The actual endurance or performance gained at loiter was little but still noticeable. The angle of bank necessary to center the yaw string varied with power on the operating engines. At loiter speed, a centered yaw string required slightly less SHP to maintain constant airspeed at altitude, but the savings were negligible.

LT J. J. Miller
VP-31

Correction

The idea for the back cover of our APR '82 issue comes courtesy of DMSN Carl S. Faz, VF-51.

Better Pilots?

Virginia Beach, VA – As a former pilot, I often hear or read about the new breed of aviator as being better trained, more skilled, and more intelligent than his predecessors. This *may* be true in part, but after reading many fine articles in *APPROACH*, I find it really difficult to accept as a whole. Take, for instance, your MAR '82 issue. There were three articles: "CV Bingo - Support = Mishap," "A Four Pac to (Bin)go," and "The Aesop (Fable) Syndrome," that lead me to believe that aviators (and supervisory/support personnel) are still making the same common sense and judgment (lack of) errors that their predecessors often made. Whether it's due to can-do-itis or high tempo ops that create the tone, it appears that the human element cannot keep up with the technological advancements of today. I think that one of the solutions is very basic – *slow down*. There are enough rules and regulations published, such as NATOPS and SOPs, but it appears that not everyone in the safety chain wants to or has time to adhere to them.

Joe Homer
Maj USMC (Ret.)

Downed Pilots and Screw Turbulence

Oakton, VA – I have just read, with a great deal of interest, the article by LTJG McClellan in your MAR '82 issue, titled "A Lesson Worth Learning."

Although I cannot say I enjoy reading stories like this, because there's no joy in tragedy, I do feel the story is well done.

Mr. McClellan failed to include one ingredient in regard to the ship's maneuver, e.g., turning into a downed pilot so that the stern will slew away from him. Additionally, the OOD is supposed to STOP ALL ENGINES to reduce screw turbulence until the person in the water is well clear. Have we forgotten this ingredient?

Earl W. Keegan
Former Air Boss

P. S. I've been off the bow – *twice*!

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: *APPROACH* Editor, Naval Safety Center, NAS Norfolk, VA 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

☆U.S. GOVERNMENT PRINTING OFFICE: 1982—539-005/8

NOW HEAR THIS...

HAZARDOUS NOISE MAY CAUSE HEARING LOSS

EAR PROTECTION REQUIRED

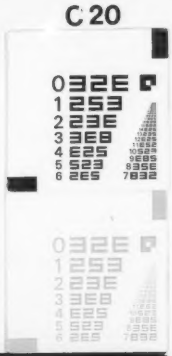
OR YOU WON'T HEAR ANYTHING AT ALL.

Poster idea courtesy of HSL-31.

Do You Know Where Your Tail Rotor is?

Naval Safety Center
NAS Norfolk, Virginia

Poster idea contributed by Maj D. P. Winston, USMC, HMH-461.


C 20